Datapro Ranks DBMS . . . Pages 10-13

COMPUTERWORLD
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## Product Spotlight
## *An Overview Of Modems*

By Brad Schultz
CW Staff

High-speed voiceband modems are nearly half as fast as they possibly could be. Useful data cannot run over conventional telephone lines at faster than 30K bit/sec owing to an immutable relationship between the digital signals exchanged by computers and the analog signals conveyed by phone lines.

Modems convert data signals from digital to analog form prior to transmission and back to digital form at the receiver end. All-digital links would make modems unnecessary.

The 30K bit/sec barrier postulated by information theorist Claude Shannon decades ago is more than twice the top speed of Paradyne Corp.'s MP 14.4 modem, which the Largo, Fla., vendor claims is the swiftest voiceband set now sold widely to commercial users. Excluding this 14.4K bit/sec model, the top speed of the fastest popular voiceband modems is 9,600 bit/sec.

Some modem classes exist for communications faster than the Shannon limit, but these support microwave broadcasts (at 56K bit/sec, for example) or transmission through specialized cable media.

Datapro Research Corp. defines the high-speed modem class as sets with top speeds in the 3,600- to 9,600 bit/sec range. Many manufacturers put the lower boundary at 2,400 bit/sec, but others call 2,400 bit/sec modems "medium speed." The charts on Page 22 and 23 represent 40 sets with top speeds of at least 4,800 bit/sec.

These charts are based on more comprehensive listings Datapro will soon publish in its annual "All About Modems" report. The re-

*(Continued on Page 22)*

### *Unscathed by Recession*
# Users Report Budgets Up 11.8%

By Ann Dooley
CW Staff

PALO ALTO, Calif. — DP budgets in 1981 will rise 11.8% over 1980 figures, according to a recent user survey in which managers reported a growing corporate importance placed on the management information systems (MIS) function.

And those organizations with more than $1 billion in sales or assets will see even higher growth — 14.5% over last year, according to the "User Panel Survey" of nearly 1,000 MIS managers in industry, finance and government conducted by Input, a consulting firm here.

According to the managers polled, most MIS budgets emerged from 1980 largely unscathed. Nearly two-thirds of the installations were unaffected by the recession, according to their department heads. Of the one-third which did feel a pinch, spending was cut by nearly 12% in their departmental budgets, according to the survey.

### Ambitious Goals

The MIS managers, however, have set some ambitious goals for themselves in the current year. Apparently wanting to have their cake and eat it too, the respondents said their primary 1981 objective is to implement more complex applications and systems, which will need to be developed by computer personnel who are in increasingly short supply.

To complicate this difficult task further, the survey results showed that programmers are currently devoting less than half their time to developing

*(Continued on Page 6)*

# High Court: Patents Possible On Part-Software Inventions

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — In two decisions of potentially far-reaching consequence for the computer industry, the U.S. Supreme Court has ruled inventions that rely in part on software or firmware are not necessarily unpatentable.

While the decisions do not reverse earlier rulings that computer programs are not patentable, they do mean inventions that use software or firmware cannot be denied patents solely on that basis.

In a 5-4 decision on March 3, the court said the U.S. Patent and Trademark Office must consider for a patent a rubber curing process that uses a computer to measure molding temperatures and times. A patent for the process, developed by Federal-Mogul Corp., Southfield, Mich., was first applied for in 1975.

### Firmware Module

In a related decision March 9, the court let stand a lower court ruling that a Honeywell, Inc. firmware-based module of its Series 60 Level 64 computer systems should be considered for a patent on the basis that it is a machine and not software, even though microcode is a part of the invention.

The two rulings, taken together, are considered a large defeat for the U.S. Patent Office, which told the court it has 3,000 cases pending "in which the patentability of computer software or firmware is a potential issue."

Industry observers were quick to hail the rulings as landmark decisions be-

*(Continued on Page 8)*

# AT&T Sure to Win Antitrust Trial, Justice Department Source Says

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — AT&T is virtually certain to win the antitrust trial now under way in U.S. District Court here because the Justice Department is being "pushed down a slippery slope." That is the view of a former member of the department's Antitrust Division two weeks after the "antitrust trial of the century" began.

His comment was made shortly after Presiding Judge Harold H. Greene refused last week to grant a two-week recess of the trial, as requested by the government's lead counsel, Gerald Connell.

Connell wanted the breather partly because the trial was proceeding faster than he had expected, but mainly because of a need to rearrange the government's presentation of its case. After Judge Greene issued his decision, Connell said it was a "setback" but not a "fatal" blow.

A source who has continuing contact with his former colleagues in the Justice Department told *Computerworld* he believes the decision is much more significant than those words suggest.

*(Continued on Page 4)*

# Designer Jeans Expose White Plastic Fraud

By Lois Paul
CW Staff

CHICAGO — When charge purchases for designer jeans from a group of stores soared from $40 per sale to $300, a computer at First National Bank of Chicago raised a red flag.

The computer system at First National, which was programmed to call attention to unusual credit card transactions, led to the discovery of a new credit card fraud gimmick here that has cost 200 American banks about $15 million in the last year.

Known as "white plastic" fraud, the scheme involves credit card blanks which criminals emboss with names and numbers taken from legitimate cards. Credit card receipts then are imprinted with the phony cards and charge plates from stores that are working with the "card sharks." A phony sales amount is written on the slips and a signature is forged.

The stores take the receipts to banks at which they have accounts and ex-

*(Continued on Page 6)*

Wide World Photo

## Ties Disrupted

British Prime Minister Margaret Thatcher met President Ronald Reagan during her visit to Washington last month, but communications between the two leaders have since been disrupted by DPers on strike in the UK. Story on Page 5.

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Please address all correspondence to the appropriate department at Box 880, 375 Cochituate Road, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1153

OTHER EDITORIAL OFFICES:

**New York City:** Suite 7G, 401 East 80th St., New York, N.Y. 10021. Telephone: (212) 570-2135.

**West Coast:** 257 Lytton Avenue, Palo Alto, California 94301. Phone: (415) 328-8064.

**Washington, D.C.:** 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

**England:** Steve Burton, IDG Publishing Ltd., 146 Clerkenwell Road, London EC1 Phone: 01-837-1222. Telex: UK-269477.

**W. Germany:** Eckhard Utpadel, CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone: (089) 34-90-61. Telex: 5215350.

**Asia:** Hidetsuna Sasaki, Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 455-6101. Telex: J2424461.

**Australia:** Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133, Telex: SECCO AA25468.

**Brazil:** Eric Hippeau, Data News, Computerworld do Brazil, Servicos e Publicacoes Ltda., Rua Alcindo Guanabara, 25/10th floor 20031 Rio de Janeiro. RJ Brazil. Phone: (021) 240-8225. Telex: 2130838(WORD BR).

**Mexico:** Kevin Kelleghan, Computerworld de Mexico, Oaxaca 21-2, Colonia Roma, Mexico City 7 D.F., Phone: (905) 514-4218, (905) 514-6309.

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# TRW-Fujitsu Offers Mini for U.S.

By Brad Schultz
CW Staff

LOS ANGELES — Japan's largest computer market last week introduced its first system for Americans, a 16-bit minicomputer for commercial end users that packs 10,000 logic gates on a single chip and drives up to 80 workstations.

TRW-Fujitsu Co. (TFC) here — 51% owned by Tokyo-based Fujitsu, Ltd. — unveiled the TFC 8500, which was called an upgrade of Fujitsu's V-830 and V-850 minis. The V-830 has sold well in Australia against U.S. competition, and future TFC systems will be based on the Japanese-built V series minis, *Computerworld* has learned [CW, Dec. 8].

The hardware Fujitsu is giving TFC for the 8500 has a mean time between failure (MTBF) on the order of 10,000 hours for major components, according to Australian sources, and this unusually high reliability rating pertains to unusually dense circuit boards. The 8500 comes with 64,000-bit random-access memory (RAM) modules rather than conventional 16K-bit RAMs, TFC noted.

The end-user system "will find extensive application in distributed, networked and stand-alone environments," he added. "Large corporations will use the 8500 at headquarters, divisions, branch sales offices and warehouses for local processing and for exchanging data with the company's central computer," he said.

The 8500 has virtually all the V-830 system software, which includes Fujitsu's Universal Operating System (Unios), the spokesman continued. Unios supports high-volume batch processing — drawing data at 62.5K bytes/sec from floppy diskettes — as well as interactive and time-sharing tasks.

The Unios Data Communications Manager (DCM) supports multiuser services, a variety of workstation configurations and message flow among workstations. The spokesman said the 8500 will fit IBM's Systems Network Architecture (SNA) after announcements made in fourth quarter, 1982 and comes now with IBM's 2780/3780, Hasp and 3270 protocols.

The 8500 costs from $25,000 for a single workstation system to $200,000 for a system with 80 workstations and will be shipped starting this July. TFC is at Suite 620, 9841 Airport Blvd., Los Angeles, Calif. 90045.

# Datapoint to Hike Some Prices

SAN ANTONIO, Texas — Datapoint Corp. announced last week that it will raise purchase and lease prices by up to 14% on some of its Attached Resource Computers (ARC) and most of its Datashare computer systems.

Effective April 2, the price hikes are aimed at nearly all of the firm's Series 6600- or 6000-based machines. Not affected by the price increase are the company's 1500, 1550 and 1800 series processors, the 3800 series ARC applications processors and Datapoint's recently unveiled 880 large-scale computer, a spokesman said. In addition, the price hikes will not touch most of the firm's peripheral products or Infoswitch communications management system.

The purchase price on certain Datapoint systems will only rise about 2.8%, the spokesman added.

Under the new pricing structure, a small Datashare 4620 system with 120K bytes of memory and 5M bytes of disk storage will now cost about $27,600 instead of $26,300. And a large-scale 6000 series processor based Datashare 4750 system with 256K bytes of memory and 120M bytes of disk plus controller will cost about $62,900, up from $61,000.

Increased labor and material costs, as well as the current state of the economy were blamed for the intended price adjustments.

# Boeing Becomes First SBS User

By Brad Schultz
CW Staff

VIENNA, Va. — Boeing Computer Services Co. last week became the first user of Satellite Business Systems' (SBS) all-digital carrier services, four months after the first SBS space vehicle was launched [CW, Nov. 24].

The Boeing Co. division will receive data, voice and video (teleconferencing) services at 56K bit/sec between an earth station here and others in Tukwila and Kent, Wash.

Boeing Computer itself supplies DP services to Boeing Co. and client users. An SBS spokeswoman said 19 other corporations have now signed for services from SBS, which is jointly owned by subsidiaries of IBM, Aetna Casualty and Surety Co. and Comsat General Corp.

At ribbon-cutting ceremonies here, a Boeing Computer executive said his company was attracted to SBS by its command of technology and potential for raising productivity.

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# STAR

## "And for the best performance in a sorting role... SyncSort!"

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## NEWS FLASH

Only a few short years ago, SyncSort was a struggling young performer trying to find work at fraternity dances, county fairs and chowder-society meetings.

But last night, as millions of TV viewers watched, SyncSort was called to the stage three times to receive the top awards of the American Academy of Sorting Arts and Sciences.

Clutching his three "Golden Softies," the Englewood Cliffs (N.J.) resident delivered an emotion-packed speech in which he said: "I want to thank my mother, my father, and over 5,000 SyncSort fan clubs around the world. Without their loyal support, I'd still be out there riding the tracks. Nobody has to tell me that there's a broken heart for every light on Broadway!"

* * * *

Well, naturally, we're proud that our brainchild did so well. But as the program's business manager we'd like to add a few sober-sided comments that may explain SyncSort's tremendous box-office appeal:

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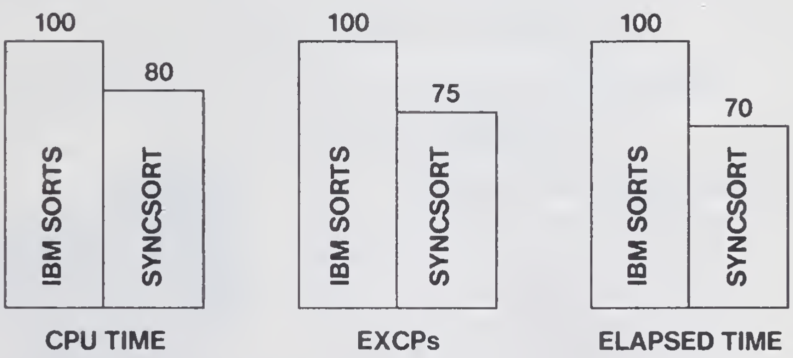

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- SUM — summarizes designated numeric fields.
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# AT&T Annual Report Cites Technology Plans

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — "I believe that 1980 was in a number of significant ways Year One of the Bell System's future . . . No longer do we perceive that our business will be limited to telephony or, for that matter, telecommunications. Ours is the business of information handling, the knowledge business. And the market we seek to serve is global."

That was how AT&T Board Chairman Charles Brown introduced Bell's 1980 annual report. It disclosed, among other highlights, that last year — while many companies had to make do with lower profits — AT&T earnings reached $8.19/share, as compared with $8.04 the previous year. Net income rose 7.1% (to $6.08 billion), and return on average total capital amounted to 9.9%, compared with 1979's 9.8%.

This year's results may be even better. The company wants to increase its authorized rate of return, currently 10.5%, to 13%, and has asked the Federal Communications Commission (FCC) for expedited consideration of the matter.

There were repeated references to new technology throughout the report. One of the most interesting services now under development is an enhancement of AT&T's present "800" service. "An auto club, for example, could have a single nationwide telephone number which motorists in trouble could call and be automatically connected — not to some answering center half a continent away — but to the nearest open service station," Brown explained.

"Another capability would let customers direct the network to forward their calls to another location — whether it be a neighbor's home or a hotel in a distant city."

### Home Communications

He also referred to AT&T's plans for home communication services. Aside from one test already underway, in Coral Gables, Fla., the company is planning two others — in Austin, Texas and Charlotte, N.C.

Both of the latter are scheduled to begin this year. The Austin trial involves an on-line telephone directory service plus tele-shopping and related offerings. The other upcoming test will enable two Charlotte utilities to remotely read the meters of some 1,000 customers and also permit the customers to control their energy consumption.

Another home communications development Brown mentioned is the recently introduced Touch-a-Matic S telephone, which stores up to 12 phone numbers internally and provides single-button auto-dialing capability. It is widely regarded as the forerunner of a more sophisticated terminal having extensive data I/O capabilities.

"Business today is spending $18 billion/year on data communication services," Brown said, "and the market is expected to reach more than $90 billion by the end of the decade." One measure of Bell's involvement in this business is a new software design and development plant Western Electric is building in Lisle, Ill., near Chicago. "This complex will house 2,400 computer programmers and others involved in providing programming to the Bell System," Brown reported. He also said that today Bell is using about 15,000 computer terminals in-house — more than one for each member of its technical staff.

It is perhaps understandable that the company views the FCC's Second Computer Inquiry Decision "as probably the single most important decision in the commission's 46-year history." AT&T was "concerned," Brown added, when the original version of this decision was issued early last year. It appeared to require that some new services "would have to be offered through a separate subsidiary. We are encouraged that the commission . . . has indicated that under certain circumstances it might waive the separate subsidiary requirement and permit the enhancement of basic network services."

Bell's 1980 annual report mentions several other technological developments, including:

- Test of a new long-wavelength lightwave system — powered by light-emitting diodes (LED) rather than lasers — in Sacramento, Calif.
- Simulation testing of glass fiber undersea communications cable.
- Plans to construct a plant in Orlando, Fla. "that promises to be one of the most advanced large-scale integrated circuit production facilities in the country."

After detailing these accomplishments, Brown addressed a number of regulatory matters now pending before Congress, the FCC and the courts. He stressed Bell's belief that, despite the Second Computer Inquiry Decision, "the authority of Congress is needed to establish the groundrules for a competitive telecommunications industry." Also, as the industry becomes more competitive, service prices will have to be readjusted upward.

"One of the most critical areas in making the transition to a competitive environment has yet to be resolved," Brown said. He was referring to the cost-averaging scheme that underlies present interstate rates and the subsidy, buried in these rates, which helps defray the cost of local exchange service.

"As competition grows," Brown explained, "such a rate structure becomes increasingly vulnerable" to competition from the specialized carriers. Since they have their own long-distance facilities, they do not have to average their rates and thus can "creamskim" — that is, "pinpoint markets where they can undercut our prices even though our costs might be lower," Brown said.

Also, "while our competitors pay a local contribution charge, this charge makes a far smaller contribution to local service than do the rates for our own like services," Brown added.

Over the long run, Brown said, the subsidy to local service "will only encourage the construction of facilities that bypass the telephone network altogether."

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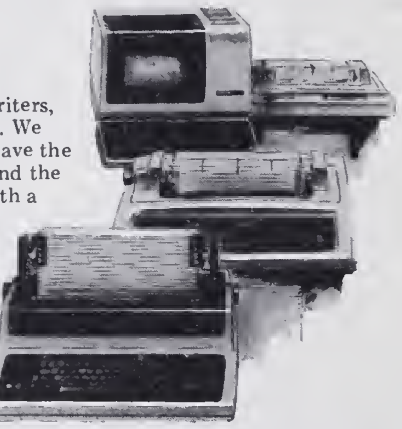

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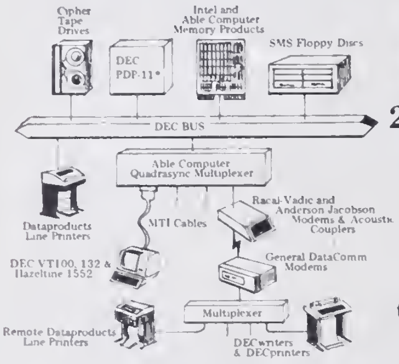
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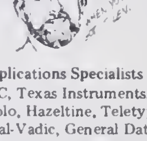

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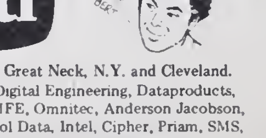

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# Justice's Case Against Bell Seen Headed for Trouble

(Continued from Page 1)

He said the latest request for delay is one of several signs that the government's case is in trouble.

Last September, Connell sought to discontinue the stipulation of facts to be presented at the trial. Judge Greene, who regards this stipulation process as crucial to speedy completion of the trial, rejected the request, saying it was "irresponsible." According to the CW source, this "unusually harsh" judicial language reflects Judge Greene's irritation with the government's trial staff.

Last January, the judge allowed a six-week delay after both sides assured him they were close to an agreement on a consent decree encompassing a negotiated settlement of the issues. That hiatus ended early this month, at the government's request. Because the incoming Reagan administration had not yet appointed a new head of the antitrust division, no one was available to sign the proposed consent decree, according to the outgoing antitrust chief, Sanford M. Litvack. He added that, despite the earlier assurances, it was now "extremely doubtful" negotiation of a consent decree could be completed by March 2, the deadline specified by Judge Greene in January.

### Request for Delay

Last week's request for a two-week recess was related closely to the stipulation process, which Judge Greene refused to discontinue last fall. Basically, neither side can present any portion of its case until efforts to stipulate the related facts have been completed. The goal is to minimize the facts that have to be argued in the courtroom, thereby shortening the trial. But Connell, echoing what he said last September, declared last week that many issues have not yet been stipulated, including some which the Justice Department had planned to introduce this week.

The trial "simply cannot be held hostage to the state of readiness of the government's preparation," Judge Greene responded. He insisted that the government knew for some time that the progress of the stipulation process was likely to interfere with presentation of its evidence, yet the trial staff "did nothing except wait until the trial started and ask for a recess. I simply don't think that's good enough."

This comment may be another sign of the judge's irritation. But in any event, the CW source said, the Justice has an additional worry.

"The longer the trial goes on, the more competitive the telecommunications industry becomes and the weaker grows the government's request for divestiture of the Bell System's key components. For unless the judge is convinced that AT&T will possess monopoly power in the future, and employ it, he isn't likely to break up the Bell System," the source said.

# Wildcat DP Strikes in UK Disrupting Nato Exercise

By Robert Batt
CW Staff

LONDON — Wildcat strikes at key data processing installations throughout the UK are disrupting a major North Atlantic Treaty Organization (Nato) military exercise that depends upon vital communications between President Ronald Reagan and Prime Minister Margaret Thatcher.

The Nato operation, known as Wintex, also involves communications between the Nato Secretary General and the three major Nato commanders. The entire operation has fallen victim to Britain's civil servants, who are holding up work at government computer centers in a dispute over pay.

Shipments of armaments, supplies for Polaris submarines with their nuclear deterrent capabilities, intelligence surveillance activities and government revenue collections have all been disrupted by the industrial action. In addition, London's Heathrow Airport was closed last Monday for the first time in 35 years as a result of air traffic controllers, using computerized equipment, coming out on a 24-hour strike.

All nine of Britain's civil service unions are involved, with more than 400,000 workers coming out on last week's one-day stoppage. But it is the follow-up action involving sporadic strikes at key DP installations that is likely to cause the most difficulties.

## Severe Disruption

The unions claim their actions will cause severe disruption to the national and international defense network, particularly Wintex, considered by the military to be a virtual dry run for total war involving extensive movements of paperwork and personnel.

Because of the strategic importance of the operation, which began March 8 and is scheduled to last several weeks, the President of the U.S. and the UK Prime Minister are traditionally involved.

The disruption of computers at the defense installations means, according to the unions, that the movement of spare parts required for the 24-hour a day operation will be affected. They claimed that two years ago, when a similar strike took place, Britain was forced to withdraw from Wintex, although this is strenuously denied by the Ministry of Defense.

The Royal Navy is a particular target of the strikers with computer operations at naval supply centers in Portsmouth, Devenport, Chatham and Rosyth affected. The strikers aim to halt the coordination of spare parts and armaments to and from those centers.

"The stopping of these computers at four key naval dockyards will disrupt and seriously delay dockyard operations, including the continuous refitting programs for warships such as the Polaris submarine. The effect will be to bring to a halt the highly sensitive system vital for the nuclear submarine operations," according to Alistair Graham, deputy general secretary of the Civil and Public Services Association.

At the same time, the unions have withdrawn their DP operators from a government security installation at Bude in Cornwall, believed to be responsible for carrying out intelligence surveillance activities. The top secret communications headquarters at Cheltenham, Gloucestershire, is being threatened with similar action. In total, 300 DP operators in defense departments are out on strike.

For the moment, the UK government is holding firm to its line that civil servants must accept a pay ceiling of 7%, although they are demanding 15%. It maintains that British participation in Wintex, while affected by the strikes, will continue.

"We have a wide range of contingency plans available to us, and we will do what is necessary to maintain the UK defense operational capabilities," a spokesman for the Ministry of Defence said.

# *Six More I/O Channels Added to IBM 3033S*

WHITE PLAINS, N.Y. — IBM has added six more I/O channels to its 3033S processor.

The 3033S, announced along with the larger 3081 in November 1980, was introduced as a scaled-down version of the 3033 uniprocessor. But IBM analyst David Stein of the Gartner Group said, "IBM overdid it." Users complained that only six channels on the 3033S would not allow them to adequately attach direct access storage devices (Dasd) without affecting throughput.

The enhancement will be available with first customer shipments of the 3033S in June. The enhancement offers users a choice of six or 12 channels. Five of the additional six channels can be block multiplexing channels, and IBM said users might gain a throughput advantage via the additional I/O paths.

The extended channels feature can be installed in the field in about 16 hours, IBM said. Prerequisites for the enhancement are a 3033S with the 3033 Extension Feature and the Extended Control Storage Feature.

The 3033S is essentially the same processor as the larger 3033U. However, performance has been degraded through microcode changes and a smaller cache buffer storage. The 3033S offers a maximum of 16 channels, IBM said.

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# Budgets Expected to Climb By 11.8% Over 1980 Figures

*(Continued from Page 1)*

new applications. The amount of programmer time available for new development has shrunk for the third consecutive year, Input noted.

So in order to meet their No. 1 objective, managers must balance increased demand for complex, on-line systems with the shortage of development personnel and staff time. How the managers plan to meet this Herculean task was not revealed by the respondents.

### Personnel Costs

The Input survey further indicated that personnel costs remain the single largest item in the DP budget, more than three times the size of the next largest item, mainframe processors. Personnel costs ate up 46.1% of the 1980 DP budget, unchanged from 1979. However, respondents expect personnel costs to grow to 46.7% of their 1981 budgets, the largest expected increase of any item.

Mainframe and peripheral budget items will grow in absolute dollar value this year but will decline as a percentage of the total DP budget, according to the survey. Other items such as minicomputers, terminals and communications hardware will grow in both dollar value and percentage of total 1981 computer budget.

The MIS managers' leading objective of installing on-line applications was given approximately twice the relative importance of the next most popular objective — converting applications. Improving personnel productivity was cited as the third most important objective by the respondents.

Three-fourths of the top 10 objectives for 1981 were directly involved with software, indicating the growing importance placed on that aspect of computing. Users ranked developing long-range DP plans fourth in importance, an objective that had never been mentioned in any of Input's previous surveys. Users also ranked batch applications development as fifth most important, in apparent contradiction to the commonly held belief that batch applications are obsolete.

Throughout the survey, respondents revealed their concern about personnel shortages. Most expect the shortfall of programmers and analysts to continue through the decade.

The managers saw their programmers on the average spending only 45% of their time on new program development, a continuing downward trend in the proportion of time spent on new development vs. system maintenance.

Managers also expect to be devoting their personal and department time on the design and installation of data base management systems, changes in operating systems and the design and installation of distributed data processing networks. All of these objectives involve implementing new and more complex software, requiring more development personnel with more experience, education and skills, Input noted.

The solutions the managers will be utilizing this year in order to reduce the time and costs of applications development include using productivity and programming aids such as TSO, DMS, ICCF or Easytrieve, on-line programming, structured programming methods, purchased software and improving personnel training.

### Training Outlays

The respondents noted that training expenditures will increase by 20% in 1981 over 1980 levels. Managers reported that roughly one-half of their DP staffs participate in some form of technical training and roughly one-quarter took part in management training last year, according to the survey.

Users also reported more involvement than ever before with the installation of software and hardware, diagnosis of failures, maintenance and repair activities performed on site. While some respondents favored performing diagnostics, others were negative about being involved in software maintenance and installation, according to the survey.

The survey also examined how users felt about office automation. While most did not rate integrating office automation with DP very highly, they did show an increasing interest in its importance over the next three years, according to the survey. While it may not be a primary objective in 1981, this area was the only one to which users said they would devote significantly more attention over the next few years.

The survey is for sale for $5,000. More information can be obtained from Steve Bishop, Input, Suite 600, 2471 East Bayshore Road, Palo Alto, Calif. 94303.

| INDUSTRY SECTOR | AVERAGE 1980 BUDGET ($ MILLION) | EXPECTED INCREASE (PERCENT) | AVERAGE 1981 BUDGET ($ MILLION) | INCREASE 1980-1981 ($ MILLION) |
|---|---|---|---|---|
| Discrete Manufacturing | $10.58 | 13.2% | $11.99 | $1.41 |
| Process Manufacturing | 4.38 | 11.1 | 4.87 | 0.49 |
| Transportation | 14.08 | 16.1 | 16.35 | 2.27 |
| Utilities | 25.81 | 12.7 | 29.09 | 3.28 |
| Banking/ Finance | 4.76 | 9.2 | 5.20 | 0.44 |
| Insurance | 3.30 | 7.9 | 3.56 | 0.26 |
| Medical | 1.12 | 10.8 | 1.24 | 0.12 |
| Education | 1.93 | 4.4 | 2.02 | 0.09 |
| Retail | 2.49 | 9.5 | 2.72 | 0.23 |
| Wholesale | 1.15 | 11.3 | 1.28 | 0.13 |
| Federal Government | 3.61 | 5.9 | 3.82 | 0.21 |
| State/Local Government | 2.62 | 8.9 | 2.85 | 0.23 |
| Services | 2.36 | 12.2 | 2.65 | 0.29 |
| Other | 1.30 | 10.5 | 1.44 | 0.14 |
| **Average for All Sectors** | **$ 5.90** | **11.8%** | **$ 6.60** | **$ .70** |

Source: Input

DP Budget Growth, 1980-1981

# 'White Plastic' Fraud Uncovered in Chicago

*(Continued from Page 1)*

change them for cash. Because federal usury laws protect customers whose card numbers are used without their knowledge, the banks are the only direct losers in this type of scam.

"It's just one more thing you have to be cautious about," Ron Bohnsak, vice-president of the Visa credit card division of First National Bank of Chicago, said.

White plastic fraud first appeared in New York about a year ago. It spread to Florida and then appeared in Chicago last spring. In Chicago, fraudulent credit card receipts submitted by a now-bankrupt chain of clothing stores cost about 100 banks more than $200,000, according to an article in the *Chicago Tribune*. First National lost about $85,000, and Harris Trust & Savings Bank lost $40,000 in the scheme.

The fraud was discovered in Chicago when the computers noted the sudden jump in the average value of credit card receipts submitted by a local group of stores specializing in designer jeans.

Checking the receipts, investigators found that those charged on Mastercard and Visa cards issued by First National were missing a distinctive symbol included on the cards as a security device. As authorities were investigating this case, the owner of the stores, Norman Freed, and another man were arrested last May by federal Drug Enforcement Administration agents at O'Hare International Airport in Chicago on charges of possession of fraudulent credit card receipts, the *Chicago Tribune* reported.

Paul Huffman, vice-president and division head of Visa data processing at First National, explained that IBM 3278 CRTs used by his department were specifically programmed to detect unusual transactions because of the threat of white plastic fraud.

First National uses an IBM 3033 with 6M bytes of memory and an IBM 370/168 with 4M bytes of memory. An IBM 3350 provides disk storage.

When Huffman's department sets up a new merchant, the average ticket and sale price for that merchant is keyed into the system. As the merchant begins sending in documents such as credit card receipts, these are checked against the initial information. If the transactions are, for example, 10% over or under the regular average, the system automatically produces a printed report on the merchant, Huffman said.

His department can then visit the store, if necessary, or check sales tickets to determine if the fluctuation is caused by a special sale or a legitimate rise in prices. If this is the case, the parameters for that merchant are revised.

According to Huffman, the fraud was a "small attempt" in Chicago. He said the banks there benefited from the experience of New York banks that had lost "huge amounts" to white plastic fraud the previous year.

"A lot of merchants were trying to crack their systems," Huffman said. Contacted on this subject, a Chase Manhattan Bank representative reserved comment on security measures being taken against this problem, citing this as proprietary information.

Grand juries in Chicago and New York recently have been studying evidence assembled by postal inspectors and bank investigators and are expected to take action soon, the *Chicago Tribune* stated.

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## *False Dun & Brandstreet Used?*

# Hardware Wholesaler Probed in Mail Sting

By Tim Scannell
CW Staff

OAK PARK, Mich. — The U.S. Postal Service is investigating a computer and office equipment wholesaler here for allegedly defrauding computer manufacturers out of expensive hardware.

For at least the last six months, Midwest Marketing Corp. has been using the U.S. mail to order peripherals from computer vendors across the country, defaulting on payments and reselling the equipment to unsuspecting buyers, according to informed sources within the U.S. Postal Service. To obtain equipment from vendors, the company reportedly uses a falsified Dun & Bradstreet, Inc. credit report, which glowingly outlines the company's financial standing.

Midwest Marketing's president, John Andrews, contends that his company is the victim of a misunderstanding and some careless sleuthing on the part of both the Postal Service and Pacific Mountain States Corp. (PMS), a California company that claims it was defrauded out of computer hardware.

"If I send you a bill, and I call you the following week and your girl says you're out of town, does that mean you're a fraud?" Andrews asked when confronted with the allegations. "Those guys (PMS) have caused us undue grief. They've made accusations that are untrue and unfounded," he added, noting that he may take legal action to defend his company's reputation.

So far, PMS is the only computer company that has stepped forward and actually accused Midwest Marketing of shady business dealings.

### Center of Investigation

The focus of the whole matter, and a key element in the Postal Service's investigation, is a $1,600 dot matrix printer ordered by Midwest Marketing in November and shipped the following month. PMS' vice-president, Thomas L. White, claimed that his company shipped the printer to Midwest Marketing's John Andrews on the basis of a Dun & Bradstreet credit report, a corporate highlights sheet complete with supplier references supplied by Andrews, and a cover memo indicating that the printer would be an evaluation unit for future orders.

About a month later, on Jan. 4, PMS received a second purchase order from Midwest Marketing, this time requesting three additional Datasouth Computer Corp. DS180 printers. However, PMS decided not to fill the second printer order until payment was received for the first printer, White explained.

For the next two weeks, White personally called Midwest Marketing in an effort to reach Andrews and question him about the payment. Unfortunately, all PMS' vice-president could get was an answering service that took messages for the wholesaling company. Finally, after leaving a message that PMS was ready to ship the three additional printers, but needed to talk to Andrews first, Midwest Marketing returned White's call on Jan. 16. When questioned about payment, Andrews assured the PMS executive that a check had been written and was in the mail.

After a week had passed and payment still had not been received, White called the local Dun & Bradstreet office to check on the validity of their report on Midwest Marketing. It was then that he discovered the report was a forgery.

According to a source at Dun & Bradstreet's Detroit office, John Andrews and Midwest Marketing are "a flat-out fraud." Dun & Bradstreet reportedly has a file on Andrews and his alleged seamy activities that is "nice and thick," the source added. In fact, the firm has been trying to gather enough evidence on Andrews' company to bring the case to court. "But he's slippery," the source said.

Andrews reportedly obtained the Dun & Bradstreet report through normal credit information protection channels. He requested to see the company's file and check to see if all the data was accurate, the source said. Dun & Bradstreet will allow a company to examine its own file, provided it is returned within 10 days.

The report was sent to John Bauer, Midwest Marketing's general manager, and listed such things as corporate bank accounts, company history and a general description of the firm's operation.

However, rather than just peruse the file, Andrews allegedly filled in his own details and is presently using copies of the personally enhanced report to obtain computer and office equipment for U.S. vendors, the source said.

Andrews, however, claimed that he never requested the report from Dun & Bradstreet, but that the credit firm sent the report to Midwest Marketing.

Dun & Bradstreat also requested that Andrews forward the company's balance sheets to help with reporting data. But Andrews refused, stating that if a customer wanted to know about Midwest Marketing, he would send balance sheets directly to the customer.

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# Universities Face DP Training Crisis: Report

By Brad Schultz
CW Staff

WARREN, Mich. — Universities are losing their ability to train people qualified for DP jobs, warned a report released here recently by The Computer Science Board.

"We have a national crisis," according to Dr. George G. Dodd, chairman of General Motors Research Laboratories and chairman of The Computer Science Board, which represents the 67 U.S. and Canadian universities that grant computer science Ph.D.s.

They granted 200 Ph.D.s last year in the discipline, down from 256 in 1975, when the number of undergraduates enrolled in computer science was half what it is now. Fewer than 100 of the new Ph.D.s took faculty positions, although universities advertised more than 600 vacancies.

The report said the number of American computer science faculty has barely increased in five years. Industry now offers computer science graduates average annual starting salaries of $20,000, $26,000 and $32,000 for holders of bachelor's, master's and doctoral degrees, respectively. In contrast, a new Ph.D. holder averages $27,000 as an untenured academic if he or she works summers, the report noted.

### Migration to Industry

Many Americans drop out of computer science Ph.D. programs to immediately earn more than their teachers, The Computer Science Board found. For the same reason, many professors leave academia for industry.

This means universities are hard pressed just to keep the number of computer scientists on their faculties constant, while droves of undergraduates sign up as computer science majors. Computer science is not DP, but many undergraduates major in the former to prepare for the latter and users depend on computer science departments as the prime source of entry-level programmers and systems analysts, the board found.

The Computer Science Board report was edited by Prof. Peter J. Denning, president of the Association for Computing Machinery (ACM) and head of Purdue University's computer science department, following a meeting of nearly all North America's computer science heads at Snowbird, Utah, last July.

Endorsed by that assembly, the "Snowbird Report" echoes some conclusions made two years ago by an ACM committee under Prof. Jerome Feldman of Rochester University [Sept. 17, 1979]. Both reports found the migration of computer scientists from academia to industry partly attributable to the spreading obsolescence of computing facilities at universities.

Besides finding their salaries at levels well below industry norms, academic computer scientists commonly find the hardware and software available to them trailing the state of the art. Not all areas of computer science research demand the most sophisticated facilities, but some areas do for progress to be made.

In contrast, industrial research centers — such as the one Dodd heads, Bell Laboratories, Xerox Palo Alto Research Center and IBM Research Center — offer state-of-the-art research facilities along with generous salaries, the Feldman report showed, and that is where many new computer science Ph.D.s go as an alternative to academia.

The Feldman report showed "we are killing the goose that laid the golden egg," Denning told *Computerworld* last week, meaning that the academic environments where much of computer science began are dying. The Snowbird report, on the other hand, shows "we are eating our own seed corn," Denning remarked, meaning that computer science professors — a resource needed to create future generations of computing professionals — are an endangered species.

Universities may need to be more selective in accepting students as computer science majors, Denning pointed out, to keep faculty-student ratios manageable. But this would require some state legislatures to change the admissions procedures they impose on public universities, which in many cases prescribe a formula for admission to the university without making one undergraduate major more difficult to secure than any other.

The Snowbird report recommends that universities improve facilities for computer science teaching and research. Also, computer science faculty should be relieved from large-class teaching loads, giving them more time to supervise graduate students and do research, the report advised.

### Higher Investment

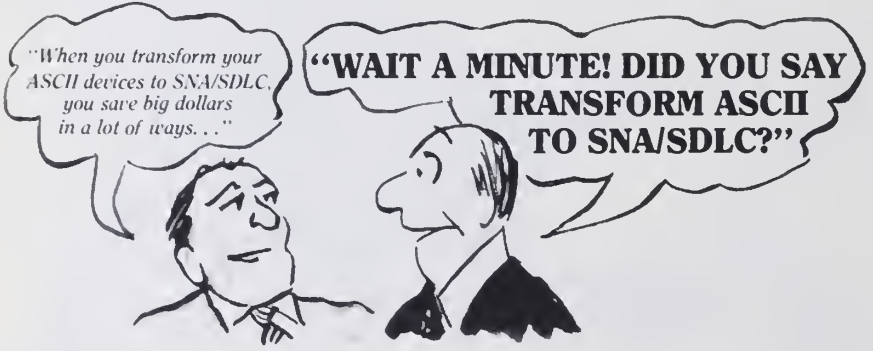
For the period of 1981-1985, the average computer science department requires capital investment per researcher in the $25,000 to $30,000 range, the report estimated. "The department that wants its research to be at the frontier of computer science will require capital investment at a much higher level — about $55,000 to $75,000 per researcher," the report declared.

However, departments that choose to not emphasize the experimental side of computer science "can get by with a capital investment of about $10,000 to $15,000 per researcher."

In each case, the report continued, about 20% of the capital investment must be added to the department's budget for maintenance and support. On this basis, the "total national cost to properly capitalize Ph.D.-granting departments' at their current number of faculty and graduate students was estimated to range from $50 million to $75 million, although 50% growth in the number of graduate students would raise the ante to about $90 million.

Where can universities get this money? Denning called on the computer industry and related professional groups to ask members of state legislatures for appropriations that would allow state universities, at least, to rehabilitate computer science departments, where the obsolescence problem is acute.

No help can be expected at the federal level, Denning told CW, given the Reagan administration's commitment to record budget slashes.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# Court Rules Patents Possible On Part-Software Inventions

*(Continued from Page 1)*

cause they will supposedly spur software innovation by protecting inventive machine processes that use computer programs.

Martin A. Goetz, senior vice-president of Applied Data Research, Inc. in Princeton, N.J., said the high-court decisions imply acceptance of the argument that software is a machine component of a computer system and that the choice between hardware and software, when implementing machine processing systems, should not affect patentability.

In the Federal-Mogul case, the patent office argued before the court the only novel aspect of the process was the use of computer software and therefore the process should not be patentable under previous court rulings.

In the Honeywell case, the patent office said the hardware-firmware device for manipulating system-based data in internal scratchpad registers is nothing more than the representation in a conventional computer of unpatentable software [CW, July 21, 1980].

"All computer-implemented algorithms are equally unpatentable," the office maintained. It is not "significant," they said, "that the novel computer program at issue here is firmware [a microprogram stored in a control unit] rather than software [a program stored in a computer's main memory unit.]"

The patent office and its board of appeals had therefore refused to consider the Honeywell device for a patent. The Court of Customs and Patent Appeals, however, ruled the inclusion of firmware does not necessarily mean a device is not patentable.

The patent office appealed that decision to the Supreme Court, which last week let stand, without comment, the lower court's ruling.

While the two cases have generated intense interest in the community of software development and commerce, the Supreme Court decisions do not in themselves imply any further patent protection for computer program from the patent office.

In its Federal-Mogul decision, written by Justice William H. Rehnquist, the court declared a patent claim "drawn to subject matter otherwise statutory [patentable] does not become unstatutory simply because it uses a mathematical formula, computer program or digital computer."

### Abstract Ideas

The decision made clear, however, that the ruling in this case does not alter earlier decisions that abstract ideas, such as mathematical formulas represented in computer programs, are patentable. "A mathematical formula as such is not accorded the protection of our patent laws," Rehnquist noted.

"On the other hand," he wrote, "when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect . . . then the claim satisfies the requirements" of the laws.

The court decision also means the rubber curing process will still have to meet the patent office test of whether the entire process is novel enough to be patented.

Addressing this point, dissenting Justices Stevens, Brennan, Marshall and Blackmun said the patent office was correct in rejecting the patent petition because the process in question "makes no contribution to the art that is not entirely dependent upon the utilization of a computer in a familiar process."

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*In the market for a DBMS? Datapro has put together a 'Buyer's Guide' in which the research firm evaluates 21 DBMS. The charts here and on the next three pages are from that report.*

| System | ADABAS | DATACOM/DB | DBMS-10 |
|---|---|---|---|
| DATAPRO 70 report number | 70E-757-01 | 70E-052-08 | 70E-384-01 |
| Vendor | Software AG of North America | Applied Data Research, Inc | Digital Equipment Corp |
| Current number of users | Over 550 | Over 250 | Approximately 60 |
| CONFIGURATION | | | |
| CPU's supported | System/360, 370, 303X, 4300, most compatibles, Siemens 4004 | System/360, 370, all compatibles | DECsystem-10 |
| Operating systems | DOS, DOS/VS, DOS/VSE, OS, OS/VS, EDOS | DOS, DOS/VS, OS, VS1, SVS, MVS, EDOS, DOS/VSE, CMS | TOPS 10 |
| Minimum memory requirements | 200K bytes | 32K bytes plus buffer space | 32K 36-bit words |
| DATA BASE FEATURES | | | |
| Data base organization | Network with full inversion | Inverted file, relational-like | Hierarchical, network |
| Application languages | COBOL, FORTRAN, PL/1, Assembler | Any language with a CALL facility | COBOL, FORTRAN |
| Data base languages | ADAMINT—high-level programming interface | DATAQUERY, DATACOM/DL | DDL, DML |
| Access methods supported | BDAM | Proprietary access method | Random, index sequential, sequential, direct |
| Variable-length segments | Yes | Yes | Yes |
| Data base security | Password for update, at file and field level, encryption | Password for update, terminal validation, encryption/decryption | Area privacy locks, subschema, system security |
| System accounting facilities | File and space statistics, log of command activity | File access, buffer usage, and space statistics | Utilization statistics |
| RECOVERY FEATURES | | | |
| Checkpoint/restart | Yes | Yes | Yes |
| Logging facilities | Autorestart function, before/after imaging | Automatic restart/recovery, full logging | Before/after imaging, automatic backup/recovery |
| OTHER SYSTEM FEATURES | | | |
| Concurrent batch/on-line | Yes | Yes (fully multithreaded) | Yes |
| Concurrent application program access | Yes | Yes (fully multithreaded) | Yes |
| Inquiry/retrieval facility | ADASCRIPT+inquiry/reporting language | DATAQUERY | IOL |
| Report generator | ADACOM | Interface to std. report writers, DATACOM/DATAREPORTER | COBOL Report Writer |
| Data dictionary support | ADABAS Data Dictionary | DATA-DICTIONARY | No |
| Telecommunications interfaces | Com-plete TP monitor and most other popular monitors | DATACOM/DC, CICS, WESTI, TASK/MASTER, etc | MCS-10, DECnet |

| System | DBMS-20 | DL/1 DOS/VS | DM-IV/I-D-S-II |
|---|---|---|---|
| DATAPRO 70 report number | 70E-384-01 | 70E-491-01 | 70E-480-01 |
| Vendor | Digital Equipment Corp | IBM | Honeywell |
| Current number of users | Approximately 60 | Datapro estimates approximately 1000 | 500—I-D-S-I, 160—I-D-S-II |
| CONFIGURATION | | | |
| CPU's supported | DECsystem-20 | S/370 Models 125 and up, 303X, 4300 Series | Honeywell Series 60, 600, 6000, Level 66, and Level 66/DPS, DPS8 |
| Operating systems | TOPS 20 | DOS/VS, DOS/VSE | GCOS, GCOS8 |
| Minimum memory requirements | 64 512-word pages | 90K to 160K bytes | 12K words plus buffers and program |
| DATA BASE FEATURES | | | |
| Data base organization | Network, hierarchical | Hierarchical (sequential and direct) | Hierarchical, network, indexed |
| Application languages | FORTRAN, COBOL | COBOL, PL/1, Assembler, RPG | COBOL 74, FORTRAN |
| Data base languages | DDL, DML | Data Language/1 | Data Definition Language, DML |
| Access methods supported | Direct, sequential, index sequential, random | VSAM, SAM, VTAM, ACF/VTAME | All CODASYL-supported access methods |
| Variable-length segments | Yes | Yes | Yes |
| Data base security | System-level file security, subschema locks, privacy locks | Password lockout at transaction level, RACF | Password, privacy keys to field level |
| System accounting facilities | Utilization statistics | Yes | Yes |
| RECOVERY FEATURES | | | |
| Checkpoint/restart | Yes | Yes | Yes |
| Logging facilities | Automatic backup/recovery, before/after imaging | Transaction logging for backout and recovery | Before/after images journalized |
| OTHER SYSTEM FEATURES | | | |
| Concurrent batch/on-line | Yes | With CICS/VS | Yes |
| Concurrent application program access | Yes | With CICS/VS | Yes |
| Inquiry/retrieval facility | IOL | With optional program product | Query & Reporting Processor, Interactive I-D-S-II |
| Report generator | COBOL Report Writer | RPG | Query and Report Processor, Procedural Language Processor |
| Data dictionary support | No | Yes | DB Access and Control System |
| Telecommunications interfaces | Through system facilities, DECnet | CICS/DOS/VS | TPS, DM-IV/TP |

## *'Important, Long-Term, Expensive'*

# Datapro Takes a Look at 21 DBMS Offerings

**By Rita Shoor**
CW Staff

DELRAN, N.J. — "Important, long-term and expensive." Those are the key words to remember when selecting a data base management system (DBMS) for your installation, according to a report from Datapro Research Corp. here.

And, if it eventually turns out that an error was made in the DBMS implementation, "have the guts and good sense to admit it before the effort has gone too far," Datapro said. Once committed to a DBMS environment, it becomes progressively more difficult and expensive to change systems, the research firm pointed out.

"A buyer's Guide to Data Base Management Systems" lists the key characteristics of 21 systems (see charts) to aid potential buyers in their assessment of various DBMS offerings.

Products in this overview are: Adabas, Datacom/DB, DBMS-10, DBMS-20, DL/1 DOS/VS, DMIV/IDS II, DMS-II, DMS 90, DMS 170, DMS 1100, DPL, DRS/XBS, IDMS, IMS/VS, Inquire, Model 204, Ramis II, Seed, System 1022, System 2000/80 and Total. Package prices were obtained more than six months ago and because these figures often fluctuate, they are not listed.

While DBMS product comparison is necessary during evaluation, the long-term planning that precedes this step is actually the most critical phase of the entire selection process, Datapro noted.

The key to planning is keeping any one person or one department from having to make all of the key decisions, the report stated. Planning should be a combined effort that requires the participation of almost every department in the corporation that will benefit from the DBMS.

The total operations of the corporation usually become much clearer to various department representatives as this integrated planning phase proceeds, Datapro noted. Comments such as "I didn't know that such a function was being performed by anyone else in the corporation," and, "Are you interested in that type of information, too? I thought my department was the only one using that data," typify the planning state, according to the research firm.

The planning phase should eventually yield the following items:

- A thorough definition of the corporate information needs, existing applications, data file structures and contents, retrieval requirements and data security needs.
- A general plan outlining overall functions and requirements of the proposed system.
- A list of functions that must be provided by the DBMS to address the system's immediate needs.
- A list of functions required from the DBMS in order to meet long-range corporate plans.
- A list of additional features that would be "nice to have in a DBMS." These are the only functions on which the purchaser should be willing to compromise when it is time for the final DBMS selection, according to Datapro.
- A clear assignment of responsibilities for the data base administrator (DBA), the general DP group and the entire user organization.

### Package Evaluation

Package evaluation follows planning, and Datapro stressed that "DBMS selection is a long-term decision. You'll soon be nearly as 'locked in' to your DBMS supplier as you are to your computer vendor," the report cautioned. Datapro recommended not eliminating the possibility of enhancing an existing system to meet newly defined requirements until "you are convinced that it is not a viable alternative."

Factors to consider during the evaluation process include the ability of each system to meet the lists of functional requirements drawn up during the planning phase; system costs — particularly when extensive system modification would be necessary; and the necessity of adding hardware required for specific DBMS.

Detailed evaluation should also include determining the number of skill levels of people needed to support the system and in-house demonstrations by the vendor.

Even if all of these recommendations are followed to the letter, the report cautioned against minimizing the magnitude of commitment required and the costs involved in DBMS installation. Experienced people are the key to successful DBMS planning and implementation, Datapro stressed.

Available for $15, the 36-page report also includes detailed analyses on six DBMS packages: Adabas, Datacom/DB, IDMS, IMS/VS, System 2000/80 and Total. Datapro is located at 1805 Underwood Blvd., Delran, N.J. 08075.

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## *When Is a DBMS Not a DBMS?*

DELRAN, N.J. — When is a data base management system (DBMS) not a DBMS — regardless of what the vendor says? When it's a data management system (DMS), according to Datapro Research Corp. here.

"These two terms have been thrown around rather loosely within the industry" the firm pointed out in a recently published report entitled "A Buyer's Guide to Data Base Management Systems" (see related article). This somewhat casual attitude has led to "massive confusion on the part of the uninitiated," Datapro observed, since a DMS is in a distinctly different software class than a DBMS.

In order to keep things straight for the report, Datapro defined a DBMS as a software system intended to manage and maintain data in a prescribed structure for the purpose of being processed by multiple applications independent of storage device class or access method. The DBMS organizes data elements in some predefined structure and retains relationships between different data elements within the data base.

The operative words in this definition are "multiple applications."

A DMS is intended primarily to permit access to and retrieval from already existing files — "usually for a single application."

While a DMS may be capable of minimizing data redundancy, modifying elements within a file and centralizing data storage, the system's principal functions are information retrieval, report generation, and inquiry for a single application, according to Datapro. Informatics, Inc.'s Mark IV was specified as a "perfect example."

Adding to an already confusing situation, the report noted that software that begins as a DMS can grow to the point where it incorporates DBMS characteristics as well as operating in DMS mode. Inquire, Ramis II and DRS/XBS from Infodata Systems, Inc., Mathematica Products Group and A.R.A.P. Advanced Data Management Division, respectively, fall into this category.

Finally, many of the DBMS vendors offer versions of their systems that are designed for either smaller or larger equipment configurations, Datapro observed. The principal purpose of the smaller versions or subsets is to introduce some form of a DBMS to users who cannot afford or do not require all of the options provided with a full-blown system. Subsetting is also designed to make the DBMS suitable for distributed processing environments, the report pointed out.

In any case, it is incumbent upon the potential buyer to know exactly what he wants — DBMS, DBMS subset or DMS — and have the vocabulary necessary to discuss it when the time comes to purchase one, Datapro cautioned.

| System | DMS-II | DMS 90 | DMS-170 |
|---|---|---|---|
| DATAPRO 70 report number | 70E-112-01 | 70E-877-01 | |
| Vendor | Burroughs Corp | Sperry Univac | Control Data Corp. |
| Current number of users | Over 400 on B 700 and 800 Series | Approximately 50 | Approximately 10 |
| CONFIGURATION | | | |
| CPU's supported | Versions for any Burroughs B 700 or 800 Series | Any Univac Series 90, 80 | CDC 6000, Cyber 70, 170, 700 |
| Operating systems | MCP | OS/3, VS/9 | NOS, NOS/BE |
| Minimum memory requirements | 128K bytes for B 1700/1800/1900 including MCP, 180K bytes for larger systems | 80K bytes plus buffers | 25K (decimal) words |
| DATA BASE FEATURES | | | |
| Data base organization | Link, network, ring, hierarchical | Network, hierarchical | Network, hierarchical, relational |
| Application languages | COBOL, ALGOL, RPG, PL/1 | COBOL | FORTRAN, COBOL |
| Data base languages | DASDL | DDL, DML | DDL, Relational DML |
| Access methods supported | All MCP-supported access methods | All CODASYL-supported access methods | Direct, indexed, random, multiple index |
| Variable-length segments | Yes | No | Yes |
| Data base security | Password capability to item level | Logical record locks, password | Area locks, subschema, data base procedures |
| System accounting facilities | System log | Yes | Yes |
| RECOVERY FEATURES | | | |
| Checkpoint/restart | Yes | Yes | Yes |
| Logging facilities | Audit trail and transaction logging | Before/after imaging, audit trail | Before and after images |
| OTHER SYSTEM FEATURES | | | |
| Concurrent batch/on-line | Yes | Yes | Yes |
| Concurrent application program access | Yes | Yes | Yes |
| Inquiry/retrieval facility | INQUIRY Language | UNIQUE | Query/update |
| Report generator | Reporter System | COBOL Report Writer | Query/Report writer |
| Data dictionary support | No | Yes | Partial |
| Telecommunications interfaces | NDL and MCS | Yes | TAF/NOS |

| System | DMS 1100 | DPL | DRS/XBS |
|---|---|---|---|
| DATAPRO 70 report number | 70E-B77-02 | 70E-657-01 | 70E-059-01 |
| Vendor | Sperry Univac | National Information Systems, Inc | A.R.A.P., Advanced Data Management Division |
| Current number of users | Approximately 600 | Over 90 installations | Over 140 on a variety of mainframes |
| CONFIGURATION<br>CPU's supported | Any Univac 1100 Series | DECsystem-10 or -20 | System/360, 370, 303X, 4300, DEC PDP-11, VAX, Univac 90/60-80, CDC 6000, 7000, Cyber, IBM 1130 and emulators |
| Operating systems | 1100 Operating System (EXEC 8) | TOPS-10 or -20 | OS/VS, TSO, CMS, IAS, RSX 11, VMS, VS 9, NOS, KRONOS, SCOPE, DNA/TSO |
| Minimum memory requirements | 15K words plus buffers | 32K words | IBM—256K bytes, CMS—548K DEC—64K bytes, CDC—27K words, Univac—300K bytes emulators—32K words |
| DATA BASE FEATURES<br>Data base organization | Network, hierarchical | Hierarchical, relational | Network, relational |
| Application languages | COBOL, FORTRAN, PL/1 | COBOL, FORTRAN, Assembler, DPL (proprietary) | COBOL, FORTRAN, PL/I, SIP (proprietary) |
| Data base languages | DDL, DML | DPL Language | DBG (proprietary) |
| Access methods supported | All CODASYL-supported access methods | Sequential, ISAM, key pointer hash, index | Proprietary access method |
| Variable-length segments | Yes | Yes | Yes |
| Data base security | At all levels including item level | Password to field or record level | Subschema locks, password access-list at data base, record, and field levels |
| System accounting facilities | Yes | Multi-user accounting log and utilities | Utilization statistics |
| RECOVERY FEATURES<br>Checkpoint/restart | Yes | Yes | Via DRS modules |
| Logging facilities | Audit trail, before/after imaging | Under user control | Tape/disk logging and recovery |
| OTHER SYSTEM FEATURES<br>Concurrent batch/on-line | Yes | Yes | Yes |
| Concurrent application program access | Yes | Yes | Yes |
| Inquiry/retrieval facility | Query Language Processor | DPL Language (with stored or interactive requests) | Via command language |
| Report generator | COBOL Report Writer, QUERY Report Writer | Yes | DRS Report Writer II |
| Data dictionary support | Yes | Data Base Directory | Integrated data dictionary |
| Telecommunications interfaces | Yes | Only those offered with the operating system | Yes |

> *'The key to planning [for a DBMS] is keeping any one person or one department from having to make all of the key decisions . . . Planning should be a combined effort that requires the participation of almost every department in the corporation that will benefit from the DBMS.'*

| System | IDMS | IMS/VS | INQUIRE |
|---|---|---|---|
| DATAPRO 70 report number | 70E-272-02 | 70E-491-01 | 70E-49B-01 |
| Vendor | Cullinane Corp | IBM | Infodata Systems, Inc. |
| Current number of users | 460 | Datapro estimates about 1500 | Over 150 |
| CONFIGURATION<br>CPU's supported | System/360, 370, 303X, 4300 Series | System/360, 370, 303X, 4300 | S/360, 370, 4300, most compatibles |
| Operating systems | DOS, DOS/VS, DOS/VSE, OS, VS1, SVS, MVS | IMS-2—OS, OS/VS, IMS/VS—OS/VS1, OS/VS2 | OS, VS1, SVS, MVS, VM/CMS |
| Minimum memory requirements | 175K bytes plus 10K for each batch job, 2K for on-line jobs | 192K bytes and up | 40K bytes—single user application program, 200K—INQUIRE user language |
| DATA BASE FEATURES<br>Data base organization | Hierarchical, network | Hierarchical (sequential and direct) | Network, hierarchical, relational-like |
| Application languages | COBOL, PL/1, ASM, FORTRAN, RPG II | COBOL, PL/1, Assembler | COBOL, PL/1, Assembler FORTRAN |
| Data base languages | DDL, DML | Data Language/1 | INQUIRE User Language |
| Access methods supported | BDAM, VSAM | VSAM, ISAM, OSAM, BSAM, VTAM, SAM, ACF/VTAM | VSAM, BDAM, ISAM |
| Variable-length segments | Yes | Yes | Yes |
| Data base security | Password protection, Database Procedures, and subschema | Password and terminal access control, RACF Extended Features | Password protection to field level |
| System accounting facilities | Automatic logging of system statistics | System Log Analysis tape and utilities | Accounting data base and retrieval routines |
| RECOVERY FEATURES<br>Checkpoint/restart | Utilities supplied, automatic with TP | Yes | Warm restart capability |
| Logging facilities | Before/after imaging to disk | Transaction backout logging | Automatic logging and backout, image utilities |
| OTHER SYSTEM FEATURES<br>Concurrent batch/on-line | Yes | Yes | Yes |
| Concurrent application program access | Yes | Yes in DB/DC mode | Yes |
| Inquiry/retrieval facility | On-Line Query | With GIS/VS product | User Language multi-key facility |
| Report generator | CULPRIT, EDP AUDITOR | GIS program product, Data Dictionary | Via User Language |
| Data dictionary support | Integrated Data Dictionary (IDD) | IMS Data Dictionary | EDICT Data Dictionary |
| Telecommunications interfaces | IDMS-DC, CICS and most other monitors | CICS/VS and IMS/DC | CICS, Intercomm, TSO, CMS |

*'Factors to consider during the evaluation process include the ability of each system to meet the lists of functional requirements drawn up during the planning phase; system costs — particularly when extensive system modification would be necessary; and the necessity of adding hardware required for a specific DBMS that currently does not exist in an installation.'*

| System | MODEL 204 | RAMIS II | SEED |
|---|---|---|---|
| DATAPRO 70 report number | 70E-174-D1 | 70E-610-01 | 7DE-536-01 |
| Vendor | Computer Corp of America | Mathematica Products Group | International Data Base Systems, Inc |
| Current number of users | Over 40 | Over 1250, including remote computing users | About 30 |
| CONFIGURATION | | | |
| CPU's supported | S/360, 37D, 3D3X, 4300, most compatibles | System/36D, 370, most compatibles | IBM S/360, 370, 3D3X, 4300, CDC 6000, Cyber, HP 3000, DEC PDP-11, VAX, DECsystem-10/-20, other minis |
| Operating systems | OS, VS1, SVS, MVS | OS, OS/VS, DOS/VS, with TSO, HASP, VM/37D, or CP/CMS | IBM MVS, VM/CMS, others—associated operating sytems |
| Minimum memory requirements | 28DK to 300K bytes | 160K bytes for nonprocedural language, 6K for all options, 45K for RPI host language interface | 40K bytes |
| DATA BASE FEATURES | | | |
| Data base organization | Hierarchical, network, relational | Hierarchical, network, relational | CODASYL network, hierarchical, relational-like interface |
| Application languages | COBOL, FORTRAN PL/1, Assembler | RAMIS II nonprocedural, COBOL, FORTRAN, PL/1, Assembler | COBOL, FORTRAN, PASCAL |
| Data base languages | User Language | RAMIS II nonprocedural language | DDL, DML, interactive DML |
| Access methods supported | OSAM, BTAM, TCAM, EXCP level | All standard IBM access methods | Hashed, chained, sequential |
| Variable-length segments | Yes | Yes | Yes |
| Data base security | Password protection to field level, by procedure/terminal | File, field, and record level protection | Privacy locks on schema/sub-schema to field level |
| System accounting facilities | Multi-user accounting log and utilities | Multi-user accounting estimation log and utilities | DBSTAT utility |
| RECOVERY FEATURES | | | |
| Checkpoint/restart | Yes | Yes | Yes |
| Logging facilities | Automatic rollback and audit trail | Logging of any combination of errors or valid transactions | Automatic backup/recovery by transaction |
| OTHER SYSTEM FEATURES | | | |
| Concurrent batch/on-line | Yes | Yes | Yes |
| Concurrent application program access | Yes | Yes | Yes |
| Inquiry/retrieval facility | User Language (ad hoc or by stored requests) | Via nonprocedural langauge | HARVEST query language |
| Report generator | User Language | Via nonprocedural language | REAP |
| Data dictionary support | MODEL 204 Data Dictionary | Yes | Integrated on schema |
| Telecommunications interfaces | Self-contained TP CICS Intercomm, TSO | CICS, IMS/DC | CMS |

| System | SYSTEM 1022 | SYSTEM 2000/80 | TOTAL |
|---|---|---|---|
| DATAPRO 70 report number | 70E-761-01 | 70E-652-01 | 70E-132-01 |
| Vendor | Software House | Intel Systems Corp | Cincom Systems, Inc |
| Current number of users | Over 60 in-house, hundreds on time-sharing | Over 700, including remote computing users | Approximately 3000 |
| CONFIGURATION | | | |
| CPU's supported | DECsystem 10/-20 | S/360, 303X, 4300, CDC Cyber Series, and Univac 1100 Series | System/360, 370, 303X, 4300, and most major minicomputers |
| Operating systems | TOPS-10/-20 | OS, VS1, SVS MVS, VM/CMS, DOS/VS, DOS/VSE, NOS, NOS/BE, OS 1100, CST | All associated operating systems |
| Minimum memory requirements | 20K words | 180K bytes—IBM,<br>32K words—Univac,<br>20K words—CDC | From 8K on minis to 40K bytes on S/37D |
| DATA BASE FEATURES | | | |
| Data base organization | Relational | Hierarchical, network | Network |
| Application languages | COBOL, FORTRAN, APL, MACRO, BASIC | FORTRAN, COBOL, PL/1 Assembler | COBOL, FORTRAN, PL/I Assembler, RPG II |
| Data base languages | PL 1022 | DDL, DBA, DML, QUEST QUBE, PLEX | DBDL, DML |
| Access methods supported | Sequential, direct, inverted | BDAM, DAM, BSAM, QSAM BPAM | BDAM, DAM VSAM |
| Variable-length segments | No | Yes—logical | Physical—no, logical—yes |
| Data base security | File and field level security | Password protection to field level | Password security to field level |
| System accounting facilities | Data base utilization accounting | Statistics and estimation tools multi-user accounting log | Logging and statistics |
| RECOVERY FEATURES | | | |
| Checkpoint/restart | Yes | Yes, automatic transaction level recovery | Yes, on-line task-level recovery |
| Logging facilities | Automatic backup/recovery, before imaging | Transaction log activity audit, rollback | Before/after imaging transaction |
| OTHER SYSTEM FEATURES | | | |
| Concurrent batch/on-line | Yes | Yes | Yes |
| Concurrent application program access | Yes | Yes | Yes |
| Inquiry/retrieval facility | Yes | System 2000/80 Query/Update facility, QUBE | T-ASK Query Language |
| Report generator | Yes | Yes | SOCRATES interface to most popular report writers |
| Data dictionary support | No | Integrated Data Dictionary | Cincom's Data Dictionary |
| Telecommunications interfaces | DECnet | CICS TSO Intercomm, TONE CMS | ENVIRON/1 CICS TASK MASTER, Intercomm |

# IDC Speakers Look to Future, Current Prospects

By Bruce Hoard
CW Staff

WALTHAM, Mass. — Speakers at the International Data Corp. (IDC) computer industry briefing held here recently opened on a wide variety of topics, ranging from the future of technology to prospects for small computer systems.

Will Zachman, director of research for IDC's Information Systems Planning Service (ISPS), claimed technology plays an integral role in the dynamics of the economy but is largely ignored in that regard.

Technology is viewed as being in "equilibrium," while things more easily measured play a larger role than in reality, he claimed. "Nobody has plugged technology in very well with the overall situation," he added.

IDC's Consulting Group Director Nancy Scull discussed the implications for management of the economy, the population and government.

Rapidly inflating salaries necessitate productivity improvement, while shortages in power and paper will move us away from paper-based offices, she said. Meanwhile, the industry will continue to be plagued by a shortage of skilled personnel and the government buying freeze will have a certain chilling effect on computer sales.

## Telecommunications Market

John Gantz, director of publications, described the complex nature of the rapidly evolving telecommunications market. Sixty-four billion dollars was spent on telecommunications last year, and that figure will grow to $115 billion in 1985, Gantz predicted.

Even though government deregulation has supposedly loosened AT&T's monopolistic grip on the market, outside competition, which controlled 1% of the market before deregulation, now controls only a slightly higher 4%, he said.

Gantz also discussed the merits and disadvantages of Satellite Business Systems, the joint venture of IBM, Aetna Life and Casualty Co. and Comsat General Corp.

"It's a simple system," he said, ticking off its advantages. "There are few moving parts. You just send a signal and bounce it back down." The 6.3M bit/sec transmission rate is another plus, he said. And because the signal is digital, it can also be encrypted for security purposes.

On the minus side, SBS is a private — and thus very expensive — network, he noted. There will be problems with interfacing equipment and protocols, and the question of "metropolitan distribution" remains unanswered.

David Terrie, editor of IDC's Office Automation Reporting Service, painted a bright picture for word processing. He said the number of word processors is growing in relation to the total number of typists and secretaries.

The most prominent trends in office automation include ergonomics (although U.S. clerical workers are less militant than Europeans), management functions (specifically electronic mail and status files), more training and support (due to less support from vendors) and more hybrid systems (with communications protocols beefed up to give access to central computers).

Speaking on the prospects for distributed data processing (DDP) and small systems, John Duffy, manager of Corporate Planning Service, said DDP product shipments will quadruple between 1980 and 1985, from $1.2 billion to $4.7 billion.

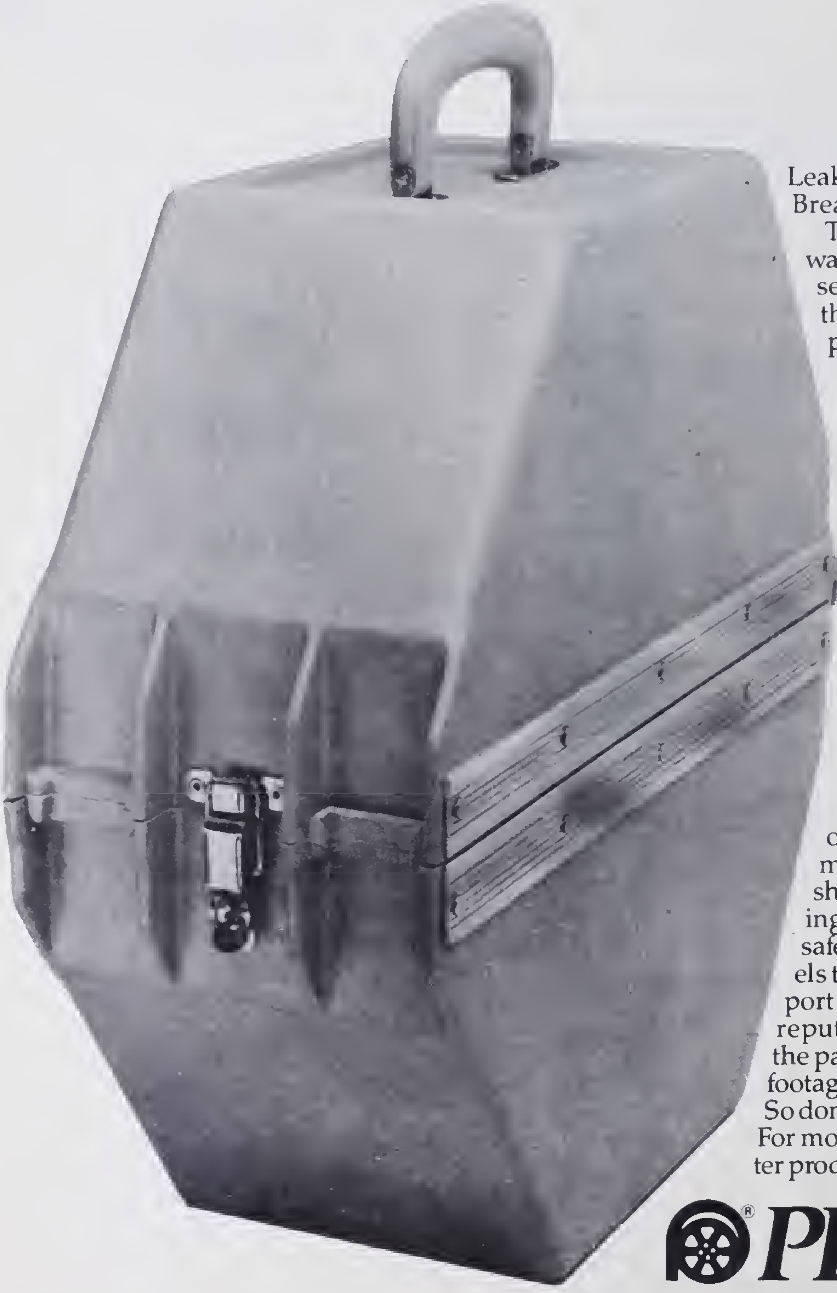
Applications areas, such as accounting and finance, will comprise a large segment of the market, while computer-aided design and manufacturing (CAD/CAM) will also make notable contributions.

## *IBM, Are You Listening?*

WALTHAM, Mass. — Fearless forecaster Jack Hart, director of research program support at International Data Corp. (IDC), has issued his 10 cast-in-concrete IBM predictions for 1981.

Hart claims to have achieved a winning percentage of .850 last year, hitting on 8.5 out of his 10 predictions. This year, he predicts IBM will:

1. Introduce a new communications controller to replace the 3705.
2. Add further enhancements to its Series/1.
3. Bring out a larger H model dyadic processor (in the year's third quarter). The new model will process 13 million to 15 million instructions per second.
4. Offer a native mode and operating system for H models as yet unseen.
5. Add new models to the 8100 line, possibly the 8150.
6. Unveil new tape streaming products that could reveal the architectural shape of things to come in larger systems of the future.
7. Produce a lower range laser printer than the 3800 which will be about half (6,000 line/min) as fast as its predecessor.
8. Add a 3,000 line/min model to its impact printer family.
9. Expand its office copier line. (This prediction became a fait accompli in late February.)
10. Offer a universal controller for tape and disk drives.



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## *Dilemmas for MIS Managers*

# Experts Warn of Industrywide 'Hot Potatoes'

By Bruce Hoard
CW Staff

WALTHAM, Mass. — Fatter DP budgets, an explosion in value-added software and a burgeoning market for mainframes and minicomputers all appear to bode well for DP managers. Or do they?

A panel of experts from International Data Corp. (IDC) speaking here recently at a computer industry briefing session discussed bad, as well as good, implications of these seemingly positive factors.

In 1981, DP budgets will exceed 1980 levels "by a whopping 20%," according to Ellen Rogers, client service director of IDC's Information Systems Planning Service (ISPS).

Personnel expenses will also continue on their precipitous climb during 1981, increasing from a 1980 figure of $26.2 billion to $31.2 billion, she predicted.

Management information systems (MIS) executives are caught in a "dilemma," Rogers said. They are expected to both cut costs and provide service to their organizations, but budgets are economic and political hot potatoes and there are no industrywide standards to follow when putting them together. "It's all determined by corporate philosophy," Rogers maintained.

Who pays for office automation, word processing and desktop computers? It could be chargebacks to end users, a strong, centralized DP budget or open-ended user autonomy, she said, adding all those methods are used by various organizations.

Doubts over the Reagan economy have dampened hiring and travel expenditures, she said. In addition, more training and development time is being spent on existing employees as part of an effort to curb the high costs of hiring outside personnel.

Industry-wise, utilities and manufacturing have grown fastest over the past five years, Rogers said. Other growth areas are agriculture and mining, which are building rapidly on a small base, and health and finance, which continue to grow strongly. But insurance, because of its large installed base, will follow a flatter growth curve.

Speaking on "Software and Value-added Solutions," Carol Weiszmann, manager of Software and Service Information Program, described the huge, $8 billion 1980 end-user software market and some of its problems.

By 1985, there will be an additional 10 million white-collar workers using four times as many computers as now exist in the U.S. work force, she claimed. And in the one-year period 1980-1981, the value of value-added supplies will almost triple, from $12,850,000,000 to an eye-opening $33,135,000,000?

### Strong Demand

The demand for application development aids is strong and is being partially met by vendors who are providing more and more software capabilities through their hardware, Weiszmann said. However, "The cost of development can actually exceed the market potential," she warned.

Hardware manufacturers with systems and utility packages will also claim a large part of that market by 1985, she added.

Moving to processing services, Weiszmann said the time-sharing market is a difficult one to assess. "Sometimes a market is over the hill and rich in opportunity at the same time," she commented.

The overall size of the processing services market will double by 1985 and remote problem solving will become the largest single factor in it by 1982. Also, turnkey system houses will mount a formidable challenge in the marketplace, she said.

Weiszmann suggested two strategies for the '80s: First, find a niche. "Pick an industry or function that cries out for automation," she said. Second, make sure your product is user-friendly.

Paul Arabasz, IDC manager of Industrial Analysis, discussed the present and future of "Mainframes and Minicomputers." Saying "The best barometer of activity in the general-purpose computer market is shipments," he noted 1980 was a record year for volume.

IBM dominated the market, garnering 70.3% of U.S. sales, 69.2% of international sales and 69.8% of the worldwide market. IBM was followed in relatively close order by Honeywell, Inc. including shipments of Xerox Corp. general-purpose computers, Univac and Burroughs Corp.

The year past saw a cooling in the trend toward purchases due to the high cost of capital, Arabasz said, adding third-party lessors were quick to take advantage of that slump. In contrast, international purchasing was strong and will remain so "for many years," he predicted.

Arabasz accused IBM of creating a shipment shortfall of 3033s "to some extent" in order to stimulate interest in the then still unannounced 3081. He supported that statement by describing how a 3033 production line that was shut down in the middle of last year — a production line that may have been retooled to handle the 3081.

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# U.S.-France Net Planned

CW Washington Bureau

WASHINGTON, D.C. — A packet-switched transmission service between the U.S. and France has been proposed by FTC Communications, Inc., a U.S. international record carrier (IRC) formerly owned by the French government. A company spokesman said he expects the new service to be on the air by next June.

Based on illustrative charges included in its application to the Federal Communications Commission (FCC), the company would charge $10/hour for PST Service plus $12 for each kilosegment — that is, 1,000 message blocks each containing 64 characters. There would also be a charge of $50 to $200, plus a $200 nonrecurring fee, for each leased-line port used by the subscriber at FTC's New York City switching center.

The proposed charges would cover service in either direction between users in New York City and France. Extensions in this country beyond New York City will be available as part of the initial offering.

# AT&T Asks Court Endorsement Of FCC's Inquiry II Decision

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — Datapoint Corp. will fight AT&T's latest attempt to offer terminal equipment and computerized information services on a deregulated basis, a Datapoint spokesman said last week.

His comment came shortly after the phone company went to court in an attempt to get its 1956 Consent Decree judicially interpreted.

The decree, according to the Department of Justice, as well as Datapoint and several other computer industry organizations, prohibits Bell from offering anything but tariffed communication services.

However, the Federal Communications Commission (FCC) ruled otherwise last December. In its "final" Computer Inquiry Decision, the commission said AT&T could offer computerized products and services on a nontariffed basis without violating the '56 decree.

Earlier this month, the phone company asked the U.S. District Court in Newark, N.J., which has jurisdiction over compliance with the decree, to resolve this dispute by endorsing the FCC's Second Computer Inquiry Decision.

## 'Major Victory'

If Bell is successful, the Datapoint spokesman said, it will give AT&T a "major victory." The phone company's right to offer on-line information services and systems would be "firmly established," he said.

Moreover, the Justice Department would have to settle for "much less relief" even if it won the antitrust suit it is now prosecuting against Bell System, and Congress "almost certainly would pay serious attention" to the New Jersey court's action in drafting a rewrite of the 1934 Communications Act, the spokesman explained.

## Decree Violated?

The 1956 Consent Decree, which AT&T signed after an earlier government antitrust suit, limits the company to provision of regulated communication services, although some exceptions are permitted.

AT&T's opponents contend the Second Computer Inquiry Decision violates the decree by allowing the phone company to offer "enhanced" services — which may involve noncommunication offerings — on a nontariffed basis through separate subsidiaries.

AT&T, in its recent petition to the New Jersey court, repeated the FCC's counterargument that the decision does not violate the decree since the permitted services would be "incidental to" communications and "subject to" commission regulation.

A hearing on AT&T's petition is likely to be convened by the New Jersey court on April 13.

# Correction

The power consumption levels for Teletype Corp. CRT terminals that Frost and Sullivan, Inc. gave in its report "Energy Efficient Data Communications Networks" [CW, Feb. 16] distorted how Teletype compares with rival vendors in this regard, a spokesman said.

The Models 40/1 and 40/2, cited in a chart that ran with an article summarizing the report, were replaced by the Model 4420, which consumes only 113W, the spokesman stated.

The levels given for the older models applied to configurations of display and printer, not the display alone.

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| Tally 1612 RO | 2,755 | 2,280 |
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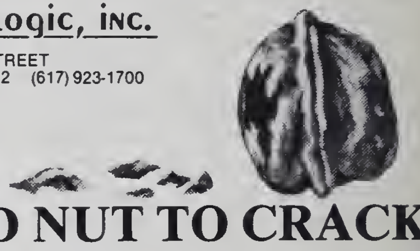

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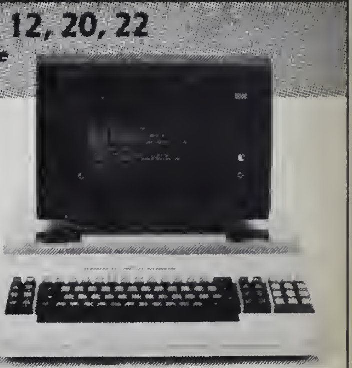

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# Datacomm Briefs

## *AT&T Under Attack For Icam Costing*

**By Phil Hirsch**
CW Washington Bureau

WASHINGTON, D.C. – An Interim Cost Allocation Manual (Icam), which recently inspired AT&T to ask for substantial increases in its private-line and Wats rates, is under vigorous attack by numerous data communications users and system vendors, as well as others.

MCI Telecommunications Corp. already has asked the U.S. Court of Appeals here to cancel the Federal Communications Commission (FCC) authorization of the new costing scheme, and the Independent Data Communications Manufacturers Association (IDCMA), representing major modem makers, has joined the suit.

Besides seeking court review, the critics want the FCC to reconsider what it wrought last year when it OK'd Icam. One major objection, as stated by the Telecommunications Association, a data communications users group, is that if the commission reconsiders, it will discover that "no basis" exists for the 16.4% increase in private-line rates which AT&T requested Feb. 13. The association added that "absent the Icam, AT&T's pending Wats rates would also be unlawful" for the company would then be exceeding its legally authorized rate of return. That rate currently is 10.5%. The Telecommunications Association said the proposed Wats rates would earn AT&T 11.7% if based on the previous cost-allocation rules.

## *New AT&T Tariff Submitted to FCC*

WASHINGTON, D.C. – A new AT&T tariff, covering the Comm-Stor II Communications Storage Unit, has been submitted to the FCC; it probably will rekindle a battle between the phone company and the computer industry, which the latter lost two years ago.

At that time, the issue was whether Pennsylvania Bell Telephone Co. should be allowed to tariff similar equipment. The computer industry, led by the Computer and Business Equipment Manufacturers Association. (Cbema), insisted that allowing Pennsylvania Bell to offer the Comm-Stor would violate FCC rules barring AT&T operating companies from providing DP services. Those rules explicitly say that "data processing" includes "the use of a computer to store, retrieve, sort, merge and calculate data according to programmed instructions," Cbema pointed out [CW, Sept. 24, 1979]. The Comm-Stor II is equipped with a microprocessor and performs all of those functions, the association added.

The upshot of the 1979 battle is that today the Comm-Stor II is tariffed in Pennsylvania and about 15 other states. Now AT&T is proposing to tariff an enhanced version for interstate private-line service. This model can be used in multipoint polled applications, as well as on a dial-up basis.

### Typical Application

Electronic mail is a typical application. Through an associated terminal, outgoing messages can be edited on the Comm-Stor II and stored on its single or dual diskette unit. When the station is polled by a remote computer, these stored messages are automatically transmitted. The Comm-Stor II also receives incoming messages. They can be output through the attached terminal or through an auxiliary printer. The main terminal can be a Dataspeed 40/2 or any other asynchronous, Ascii code-compatible device, an AT&T spokesman said. One of the options is an Ascii-Ebcdic converter which makes the Comm-Stor II usable with IBM 3740s.

Proposed charges for the Comm-Stor II Communications Storage Unit range from $175- to $230/mo, plus a one-time $300 installation charge. Polling capability costs $45 more per month, plus installation and additional memory charges, while the auxiliary printer is priced at $23/mo. The Comm-Stor II is manufactured by Sykes Datatronics, Inc., Rochester, N.Y.

The tariff carries a May 21 effective date.

# New York Police Use Data Base To Net Notorious Cop Killer

**By Bob Johnson**
CW New York Bureau

NEW YORK – New York's most wanted criminal, convicted cop killer Albert Victory, was captured recently by New York State police with the help of computer services offered by Grumman Aerospace Corp. of Bethpage, N.Y.

Because of the vast amount of information collected since Victory's escape from Green Haven prison here in 1978, the police figured the only way to make any sense out of it all was to use a computer.

Victory had been serving 25 years to life at Green Haven for his conviction in the slaying of a 25-year-old New York City police officer in May 1978. He has been on the loose ever since.

Undertaking the project as a public service, Grumman set up a Digital Equipment Corp. LA120-BA terminal and hard-copy printer at the World Trade Center offices of the state police. The terminal was connected on-line over telephone lines to Grumman's Amdahl Corp. 470 V/6 CPU in Bethpage.

Nearly 2,000 names, addresses, telephone and license plate numbers as well as other information associated with Victory's criminal career had to be entered into a special data base.

Extensive search capabilities were designed for the police, and a software hierarchy of different data was needed to carry out the project. According to a manager of systems development at Grumman, the police revealed that this project was a new software concept in law enforcement.

When all of the number and name crunching was processed, links of information were made, which helped to establish where Victory and his associates had been and where they might be headed.

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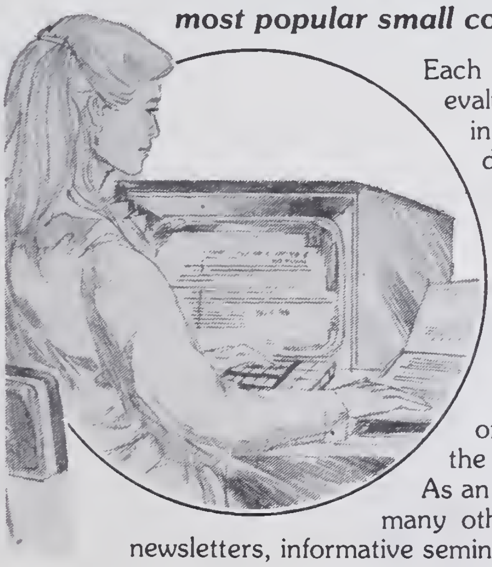

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ACU HAS THE FACTS

# Computer Science Grads Top Wanted' List

PRINCETON, N.J. — Computer science graduates top the "most wanted" list of technical specialists, according to a major survey just published.

According to the 1981 edition of *Peterson's Annual Guide to Careers and Employment For Engineers, Computer Scientists and Physical Scientists*, computer specialists will be recruited by more firms than graduates in any other discipline. The book, published by Peterson's Guides, Inc. and based on a survey of 947 employers hiring technical graduates this year, also shows that graduates entering the DP profession can expect to be among the highest paid of the 91 different technical disciplines surveyed.

Computer science graduates fresh out of college with a bachelor's degree can expect to earn around $19,200. Those with Ph.D.s can expect to pick up around $28,000.

"With industry offering Ph.D.s such attractive salaries, it's no wonder that academic positions are going begging," said Dr. Sandra Grundfest, a former career counselor at Princeton University and project editor for the guide. She also stressed the marketability of computer science graduates with many companies in all major fields.

Those in great demand at the doctoral level include system design and system science specialists, programmers and language experts. Those majoring in related disciplines, such as electronics and information science, are also keenly sought.

Of the organizations surveyed, 519 companies and 48 branches of the federal government were looking for graduates of computer science, while 160 firms and 15 different government branches were seeking graduates specializing in computer engineering. In information science, the respective figures were 301 companies and 18 federal government bodies.

According to Peterson's guide, most of the computer science and engineering graduates are wanted for work in the research and development field, or in technical services such as design, testing, instrumentation and feasibility studies.

The 647-page employment compendium reveals that between them, the 947 firms surveyed expect to review 1.1 million applications this year in hiring a total of 80,000 technical graduates at bachelor's, master's and doctoral levels.

IBM, Honeywell, Inc., Burroughs Corp. and Hewlett-Packard Co. are among the major computer vendors included, as well as smaller outfits such as Computervision Corp., the Massachusetts-based computer-aided design manufacturer, and Creative Computing, a small firm employing fewer than 100 people in Morristown, N.J.

Comsat Laboratories, the satellite communications pioneer of voice and video digital message transmission and Cincinnati Milacron, Inc., the huge industrial robot and numerical machine tool manufacturer, are also featured.

## Hunting Help

Using the guide, job hunters can reportedly identify and contact 56 design and development companies, 76 research organizations, 50 consulting firms and 464 production companies, as well as federal and state government agencies, transportation companies and construction firms.

Employees with a definite preference for a certain size of company can use the guide's "Size of Work Force Directory" to locate firms in each of six categories, while those wishing to work in leading edge companies can look up those organizations forging new frontiers in manufacturing and technology.

Included in the 1981 edition is a new directory for job-related graduate study, which indicates that 85% of the firms surveyed provide support for this type of study, usually in the form of 75% to 100% reimbursement for tuition and fees.

*Peterson's Annual Guide to Careers and Employment for Engineers, Computer Scientists and Physical Scientists* is available for $12 plus postage from Peterson's Guides' Order Department, P.O. Box 2123, Princeton, N.J. 08540.

# Courses Target Bank Managers

WASHINGTON, D.C. — The American Bankers Association (ABA) is offering two National Schools of Bank Card Management for bankers wishing to improve management of bank card programs. The two schools have separate locations and different emphases.

The first session, to be held March 29-April 4 at the California State Polytechnic University in Pomona, will offer an in-depth look at bank credit card systems.

Northwestern University in Evanston, Ill., is the site of the second course, scheduled for July 19-25. Curriculum emphasis for this session centers on the bank card in electronic banking delivery systems.

Both schools employ general session lectures, concurrent sessions, peer group discussions and case analysis as learning tools. ABA members pay $600 per program, nonmembers pay $750. Additional information can be obtained from Barbara Scotland, ABA, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

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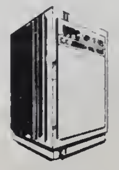

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10700 North De Anza Blvd., Cupertino, CA 95014
(800) 538-9660 Ext. 2626; in California call (408) 255-0900 Ext. 2626

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# Fastest High-Speed Voiceband Modem Sold

## Product Spotlight

| Model | Speed (Bit/Sec) | Transmission[1] | Interface/ Compatibility | Features[2] | Unit Price |
|---|---|---|---|---|---|
| Bell Dataphone II 2048A | 4,800 | Synchronous, H/F | RS-232C, RS-449 | AE, Real-Time Diagnostics | Lease Only [3] |
| Bell Dataphone II 2048C | 4,800 | Synchronous, H/F | RS-232C, RS-449 | AE, Real-Time Diagnostics | Lease Only [3] |
| Bell Dataphone II 2096 | 9,600 | Synchronous, H/F | RS-232C, CCITT V.24 | AE; Local, Remote Loopback | Lease Only [3] |
| Codex CS 9600 | 9,600<br>4,800 | Synchronous, H/F | RS-232C; RS-449; CCITT V.10, V.24, V.28 | AE, Integral 4-Channel Mux | $7,975 |
| Codex LSI 96/V.29 | 9,600<br>7,200<br>4,800<br>2,400 | Synchronous, H/F | CCITT V.24, V.28 RS-232C | 253,100 msec Turnaround/Train Time; AE; Local, Remote Loopback; Options: Alternate Voice/Data, Secondary Channel | $6,800 |
| Codex CS 48FP | 4,800<br>2,400 | Synchronous, H/F | CCITT V.10 or V.24, V.28, RS-232C | 9 msec Turnaround/Train Time, AE, Secondary Channel | $4,175 |
| Codex LSI 48/V.27 bis ter | 4,800<br>2,400 | Synchronous, H/F | CCITT V.24, V.28; RS-232C | 9 msec Turnaround/Train Time; 12 Operating Modes; AE; V.54 Local, Remote Loopback; Optional Alternate Voice/Data | $3,500 |
| Codex 5208R | 4,800 | Synchronous, H/F | CCITT V.24, V.28; RS-232C | Automatic or Manual Answer; AE; Adjustable Compromise Equalizer; Leased Dial/Point-to-Point Modes | $2,450 |
| Gandalf SM 9600 | 9,600 | Synchronous, H/F | CCITT V.24, RS-232C | AE, Multilevel Frequency Modulation | $4,000 |
| General Datacomm MPF-208-9A | 4,800 | Synchronous, F | RS-232C | AE; Local, Remote Loopback | $2,795 |
| General Datacomm 9600 | 9,600<br>7,200<br>4,800 | Synchronous, F | RS-232C; CCITT V.24, V.28 | AE; Accepts Unconditioned Lines, Local, Remote Loopback Diagnostics | $4,200 |
| IBM 3864-1 | 4,800<br>2,400 | Synchronous, F | RS-232C; CCITT V.24, V.28 | AE; Local, Remote Loopback Diagnostics, for SNA | $4,045 |
| IBM 3864-2 | 4,800<br>2,400 | Synchronous, H | RS-232C; CCITT V.24, V.28 | AE; Local, Remote Loopback; for SNA | $4,275 |
| IBM 3865 | 9,600<br>4,800 | Synchronous, H/F | RS-232C, CCITT V.24, V.28 | AE; Local, Remote Loopback, Diagnostics; for SNA | $6,130 |
| Infotron DL 9600 | 9,600<br>4,800 | Synchronous, F | RS-232C, CCITT V.24 | AE; Local, Remote Loopback Diagnostics | $5,500 |
| Intertel MCS 9600 | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-232C | AE, Accepts Unconditioned Lines, Network Control Card, 4-Channel Multiplexer Optional, Dial Backup | $6,600 (Stand-Alone) |
| Intertel MCS 4800 | 4,800 | Synchronous, H/F | RS-232C | AE; Accepts Unconditioned Lines, Network Control Card, 4-Channel Multiplexer Optional, Dial Backup | $3,375 (Stand-Alone) |
| Livermore Data 440/48 | 4,800<br>2,400 | Synchronous, H/F | RS-232C | Turnaround 250 msec; AE; Local, Remote Diagnostics | $2,045 |
| Micom 4048/4096 | 9,600<br>4,800 | Synchronous, H/F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics | $3,200, $5,250, Respectively |
| Micom Micro 500/48, 96 | 9,600<br>4,800 | Asynchronous, F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics; Turnaround 50 msec | $4,000, $5,500, Respectively |

(Continued from Page 1)

port costs $15.

High-speed modems generally mark sophistication in data communications. Typically, users begin with lower speed models, placing two sets at opposite ends of each phone line and running a number of lines at different speeds — none faster than, say, 1,200 bit/sec.

Eventually, the user may install multiplexers that reduce the number of lines needed for data communications and therefore reduce need for low-speed modems. With a multiplexer, data that had run at different speeds through a number of lines can run at different speeds through a single line, which commonly has a high-speed modem at either end.

Users naturally want to move data as fast as possible, partly because the data may be urgently demanded at its destination, but also because carrier costs are increasing, building incentive to get more data across under the latest fee schedule.

Still, the pipelines have gotten too fast for the pumps in many cases. What good are 9,600 bit/sec lines if the user's computer equipment cannot transmit or receive at faster than 1,200 bit/sec?

Rather than take the expensive recourse of replacing current processors and peripherals with faster models, many users have installed high-speed modems along with multiplexers.

### Highly Competitive Market

Few areas in the manufacturing and marketing of information technology are as competitive as high-speed modems. The race is not necessarily aimed at getting users as close as possible to the Shannon limit — the vendors know better than to try selling modems that run faster than the lines and hardware available to users.

Instead, the leading high-speed modem makers have concentrated research and development on delivering more features at 2,400-, 4,800-, 7,200- and 9,600 bit/sec and at increasing compactness while reducing power consumption. In the latter regard, Timeplex, Inc. recently announced a high-speed modem family allowing the user to stack up to 16 sets in a rack space 10.5 inches high and permitting the communications interface as well as the "data pump" (the modem's vital organs, pegged for a particular speed range) to be replaced in seconds [CW, Feb. 23].

In sheer range of features and number of different models within the high-speed class, however, Paradyne, Motorola, Inc.'s Codex Corp. subsidiary, and Racal-Milgo, Inc. seem in a league by themselves right now. Other leaders include Intertel, Inc., General Datacomm Industries, Inc., Infotron Systems Corp. and Micom Systems, Inc.

Some of these manufacturers have already incorporated, or will eventually

### FOOTNOTES

[1] "H" means half duplex; "F" means full duplex.

[2] "AE" means automatic equalization.

[3] Monthly lease payments for multiple-mounted and individually housed versions, respectively, of Dataphone IIs above are: 2048A, $125, $135; 2048C, $135, $150; and 2096, $195, $210.

# Runs Half the Postulated Limit of 30K Bit/Sec

incorporate, high-speed modems within multiplexers (or vice versa). An important trend has been to put more intelligence in the units, allowing them to assume certain reponsibilities for network control hitherto shouldered by the user's host systems or communications processors.

### Bell's Participation

AT&T does not dominate the high-speed modem arena. In fact, many Bell companies buy most of the high-speed sets they use internally from independent vendors, although Bell's Western Electric Co. subsidiary offers several high-speed models under the Dataphone II banner.

Both Bell and IBM have just token representation in the arena, spokesmen for competitive vendors told *Computerworld*. Those giants sell high-speed modems as a minor part of comprehensive solutions to data communications problems, the spokesmen claimed, and have concentrated research and development resources on other kinds of equipment.

Bell's announcement that it will eliminate need for modems through a Digital Data Service (DDS) featuring a network of all-digital phone lines has not helped Dataphone II salesmen, two industry watchers pointed out.

Meanwhile, the brisk trade in high-speed sets has not cut demand for slower models, they said, reflecting the fact that many users are still new to data communications and have yet to require multiplexing.

The Datapro report will be available soon from the research company at 1805 Underwood Blvd., Delran, N.J. 08075.

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**The 14 high-speed modem vendors represented in the charts have the following addresses.**

**Bell (AT&T): Contact local Bell System office.**
**Codex Corp. (subsidiary of Motorola, Inc.), 20 Cabot Blvd., Mansfield, Mass. 02048.**
**Gandalf Data, Inc., 1019 S. Noel, Wheeling, Ill. 60090.**
**General Data Communications Industries, Inc., One Kennedy Ave., Danbury, Conn. 06810.**
**IBM (Data Processing Division), 1133 Westchester Ave., White Plains, N.Y. 10604.**
**Infotron Systems Corp., Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.**
**Intertel, Inc., 6 Vine Brook Park, Burlington, Mass. 01803.**
**Livermore Data Systems, Inc., 2050 Research Drive, Livermore, Calif. 94550.**
**Micom Systems, Inc., 9551 Irondale Ave., Chatsworth, Calif. 91311.**
**Paradyne Corp., 8550 Ulmerton Road, Largo, Fla. 33540.**
**Penril Corp. (Data Communications Division), 5520 Randolph Road, Rockville, Md. 20852.**
**Racal-Milgo, Inc., 8600 N.W. 41st St., Miami, Fla. 33166.**
**Timeplex, Inc. (Transmission Products Division), 6791 Cross Bayou Drive, Largo, Fla. 33543.**
**Universal Data Systems, Inc., 5000 Bradford Drive, Huntsville, Ala. 35805.**

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## Product Spotlight

| Model | Speed (Bit/Sec) | Transmission[1] | Interface/ Compatibility | Features[2] | Unit Price |
|---|---|---|---|---|---|
| **Micom 8900/48** | 4,800 | Asynchronous, F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics | $4,250-$7,100 |
| **Micom Micro 8000/48, 96** | 9,600<br>4,800 | Asynchronous, Synchronous, F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics | $4,250<br>$8,600 |
| **Paradyne MP 14.4** | 14.4K<br>12.2K<br>9,600 | Synchronous, H/F | RS-232C; CCITT V.24, V.26 | AE; Accepts Network Diagnostics; Analysis; Alternate Voice, Data Optional | $14,400 |
| **Paradyne RP-96** | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-232C, CCITT V.24 | AE; Turnaround 20 msec; Local, Remote Diagnostics | $6,800 |
| **Paradyne MP 96** | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-232C, RS-449, MIL 188-114 | AE; Accepts Network Diagnostics; Analysis; Alternate Voice, Data Optional | $6,500 |
| **Paradyne MP 48** | 4,800<br>2,400 | Synchronous, H/F | RS-232C; RS-449; CCITT V.24, V.26 | AE; Accepts Network Diagnostics; Analysis; Alternate Voice, Data Optional | $3,000 |
| **Paradyne LSI 96** | 9,600<br>7,200<br>4,800 | Synchronous, F | RS-232C, MIL-188C | AE; Remote, Local Loopback Diagnostics | $6,000 |
| **Paradyne LSI 72** | 7,200<br>4,800 | Synchronous, F | RS-232C, MIL-188C | AE; Remote, Local Loopback Diagnostics | $4,000 |
| **Penril 9629 LSI** | 9,600<br>7,200<br>4,800 | Synchronous, F | RS-232C, CCITT V.24 | AE; Remote, Local Loopback Diagnostics | $5,900-$7,000 |
| **Penril 4800DCM** | 4,800<br>2,400 | Synchronous, F | RS-232C, CCITT V.24 | AE; Designed for Multipoint Network; Remote, Local Loopback Diagnostics | $2,910 (Basic) |
| **Racal-Milgo MPS 9629** | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-449, RS-232C, CCITT V.24, MIL-188C | AE; Local Analog, Digital Loopback Diagnostics | $6,800 |
| **Racal-Milgo MPS 7201** | 7,200<br>4,800<br>2,400 | Synchronous, H/F | RS-449, RS-232C, CCITT V.24, MIL-188C | AE; Local Analog, Digital Loopback Diagnostics | $5,700 |
| **Racal-Milgo MPS 4801** | 4,800 | Synchronous, H/F | RS-449, RS-232C, CCITT V.24, MIL-188C | AE; Local Analog, Digital Loopback Diagnostics | $4,000 |
| **Racal-Milgo MPS 48** | 4,800 | Synchronous, H/F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics | $3,600 |
| **Racal-Milgo MPS 9601** | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-449, RS-232C, CCITT V.24, MIL-188C | AE; Local, Remote Diagnostics | $6,700 |
| **Racal-Milgo CMS 9601** | 9,600<br>7,200<br>4,800 | Synchronous, H/F | RS-449, RS-232C, CCITT V.24, MIL-188C | AE; Local, Remote Diagnostics | $5,700 |
| **Timeplex M9600** | 9,600<br>4,800 | Synchronous, F | RS-232C, CCITT V.24 | AE; Local, Remote Diagnostics | $4,950 |
| **Timeplex AIM Series 9600** | 9,600<br>7,200<br>4,800 | Asynchronous, Synchronous, F | RS-232C, RS-449, CCITT V.29, MIL-188-114 | AE; Options Include Asynchronous to Synchronous Conversion and 4-Channel Band Splitter | $6,500 (Stand-Alone) |
| **Timeplex AIM Series 4800** | 4,800<br>2,400 | Asynchronous, Synchronous, F | RS-232C, RS-449, CCITT V.29, MIL-188-114 | AE; Local Analog, Digital Loopback Diagnostics; Options Include Asynchronous to Synchronous Conversion and 4-Channel Band Splitter | $2,975 (Stand-Alone) |
| **Universal Data UDS-208B** | 4,800 | Synchronous, H | RS-232C | AE; Remote, Local Loopback Diagnostics | $2,450 |

Source of Charts: Datapro Research Corp.

# *IBM Consolidates Credit Departments*

ARMONK, N.Y. — IBM has consolidated the credit departments of its Data Processing Division, General Systems Division and Office Products Division into a wholly owned subsidiary, the IBM Credit Corp.

Details of exactly how the corporation will work have not been resolved yet, but the IBM credit picture will not change from the user's standpoint, a spokesman said.

### Same Agreements

IBM will continue to offer the same basic agreements to its customers; however, the accounts will be managed by one large group instead of three smaller ones, the spokesman added.

So far, IBM plans to offer credit only to IBM customers. The spokesman declined to say whether the firm also plans to offer credit to users buying other hardware.

The corporation will finance installation payment agreements for U.S. customers only, the IBM spokesman said.

David A. Finley, recently elected assistant treasurer of IBM, was named president of IBM Credit Corp.

When and where the Credit Corp. will open for business has yet to be announced.

# DOD Trademarking Ada To Establish Standard

**By Robert L. Glass**
Special to CW

WASHINGTON, D.C. — The name Ada, as applied to the Department of Defense's (DOD) new programming language, is being trademarked by DOD.

The goal of the trademarking effort is to "ensure that Ada is established as a consistent, unambiguous standard," according to Lt. Col. Larry E. Druffel of the U.S. Air Force, Ada program director.

To support this goal, DOD has also contracted for an Ada compiler validation system and will insist that "no compiler may be called an Ada compiler unless a certificate of validation issued by the DOD Ada Joint Program Office is current." That restriction, however, will not be applied to Ada compilers built for purely academic usage.

### Strict Guidelines

The Ada guidelines are strict when it comes to both subsetting and extending the language. Subsets are forbidden except in cases of hardware incapability and extensions are not encouraged.

Several major implementations of Ada, and many smaller scale projects, are currently under way. Softech, a Boston-based software house, is under contract to the U.S. Army for what will probably be the first production Ada Compiler to be on the VAX computer and completed by late 1982. Three companies are currently producing competing designs for an Ada compiler and standard Ada tool set under contract to the U.S. Air Force, with one design to be selected for implementation. Competitors are the teams of Computer Sciences Corp./Software Engineering Associates, Intermetrics, Inc./Massachusetts Computer Associates and Texas Instruments, Inc. Product completion should happen in 1983.

Several universities, including Carnegie-Mellon, the University of Karlsruhe (Germany), Stanford University and the University of York (England) are also involved in compiler efforts, as are a number of corporations including Telesoftware, Sperry Univac and a consortium of CII Honeywell Bull, Inc./APSYS/Siemens AG.

Interest in Ada continues to run high. More than 650 attended a symposium on the Ada programming language in Boston in December. An active Ada Implementor's Group has been formed.

The Ada language was named for Ada Augusta, the Countess of Lovelace, an assistant to Charles Babbage and the world's first programmer. The language has been designated MIL-STD-1815 and now appears on the DOD Instruction 5000.31 list of approved languages.

# Third Comet Meet Set for April 14-15

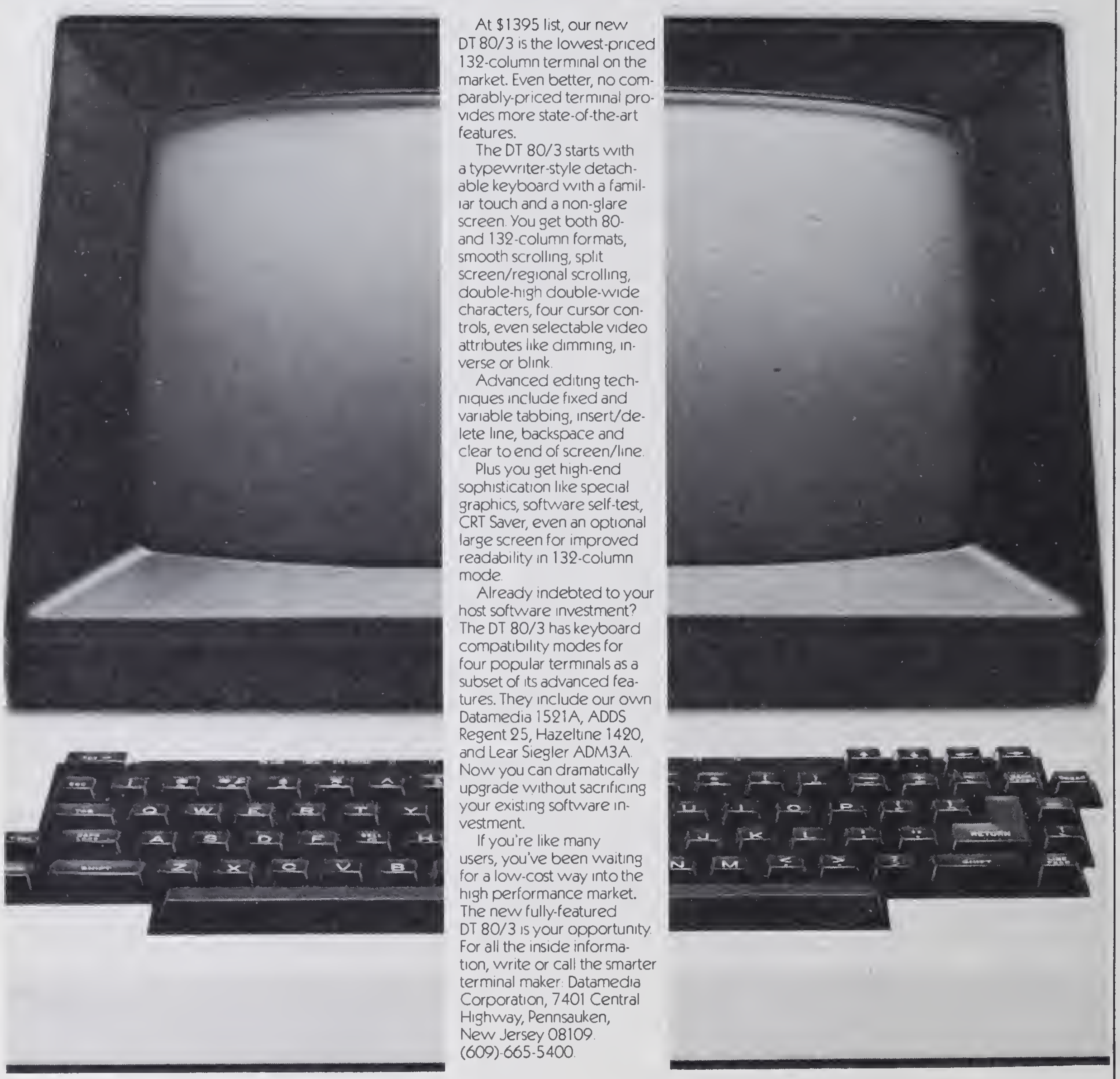
ARLINGTON, Va. — The third annual meeting of Comet users will be held here April 14-15. Comet is an electronic mail system offered by Computer Corp. of America.

The meeting's theme, "Office Automation in Action," will be addressed in conference presentations by representatives from the Insurance Co. of N. America; Bechtel, Inc.; Manufacturers Hanover Trust; and the U.S. Department of Agriculture.

Comet runs on Digital Equipment Corp.,'s PDP-11 minicomputers and IBM mainframes. A recent agreement with FTC Communications, Inc. gives Comet subscribers access to telex stations in countries worldwide, the vendor said.

There is no charge for those wishing to attend the meeting and more information is available from Mansur, Advertising/Public Relations, Suite One, One Framingham Center, Framingham, Mass. 01701.

**We've just opened up the 132-column terminal market.**



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Plus you get high-end sophistication like special graphics, software self-test, CRT Saver, even an optional large screen for improved readability in 132-column mode.

Already indebted to your host software investment? The DT 80/3 has keyboard compatibility modes for four popular terminals as a subset of its advanced features. They include our own Datamedia 1521A, ADDS Regent 25, Hazeltine 1420, and Lear Siegler ADM3A. Now you can dramatically upgrade without sacrificing your existing software investment.

If you're like many users, you've been waiting for a low-cost way into the high performance market. The new fully-featured DT 80/3 is your opportunity. For all the inside information, write or call the smarter terminal maker: Datamedia Corporation, 7401 Central Highway, Pennsauken, New Jersey 08109. (609)-665-5400.

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# TI Launches 'Personal Information Terminals'

DALLAS — Texas Instruments, Inc. has launched a series of compact "personal information terminals" primarily intended to access remote data base services and electronic mail from a position at the operator's elbow.

The first model in TI's projected Insight Series 10 stands 12 in. high and displays 24 rows of 40 characters on a 5.5 in. swivel CRT screen. This Series 10 comes with an RS-232C interface and communicates at 300 bit/sec in asynchronous full-duplex or echoplex mode. A companion receive-only thermal printer, the Insight Series 10/1, is also available now, TI added.

To access remote data bases or a host system, the operator dials a telephone number, types in the log-on sequence and is then on-line, TI stated. Office correspondence that otherwise would be delivered on paper can be entered on the Series 10's 53-char. Ascii keyboard, which features alphanumeric, control and cursor keys.

The Series 10 has a built-in modem and was designed for use by nontechnical personnel, a TI spokesman pointed out. The operator can plug the terminal into a standard wall telephone jack and a standard telephone, flipping a talk/data switch when the phone is needed for voice conversations.

The Insight Series 10

Although Series 10 can display no more than 960 characters at a time, it will show a received 80-char. row of text as two 40-char. rows. Besides this "wraparound" feature, the terminal offers automatic scrolling and will erase the top line of text on its screen to make room for a line added when the screen is full.

### Command Module

For log-on to a remote computer system, the operator may employ an optional Command Module that stores as many as eight prerecorded functions with 32 characters per function. Once coded, the TI spokesman explained, the Command Module is inserted in a slot on the keyboard.

Recorded keystrokes can then be transmitted automatically when the operator depresses the function key and any one of the eight numeric keys to activate a particular function. Editing features on the Series 10 allow the operator to back space, erase and overwrite characters while communicating with a compatible data base.

Both the Insight Series 10 terminal and Series 10/1 receive-only printer cost $995 each. TI's address is P.O. Box 202145 H-568, Dallas, Texas 75220.

# Dema to Host Three-Day Meet

STAMFORD, Conn. — The Data Entry Management Association (Dema) is sponsoring a three-day meeting and conferences in Nashville on April 13-15 and in Toronto on June 8-10.

The three days are split into two separate sessions. The first day-and-a-half features a mini conference with participative workshops on such topics as managing today's employees for greater productivity, quality controls and the future directions for data entry.

The remaining day-and-half is devoted to a seminar with a choice of two courses: increasing quality and productivity in your data entry department, or improving supervisory skills and management techniques.

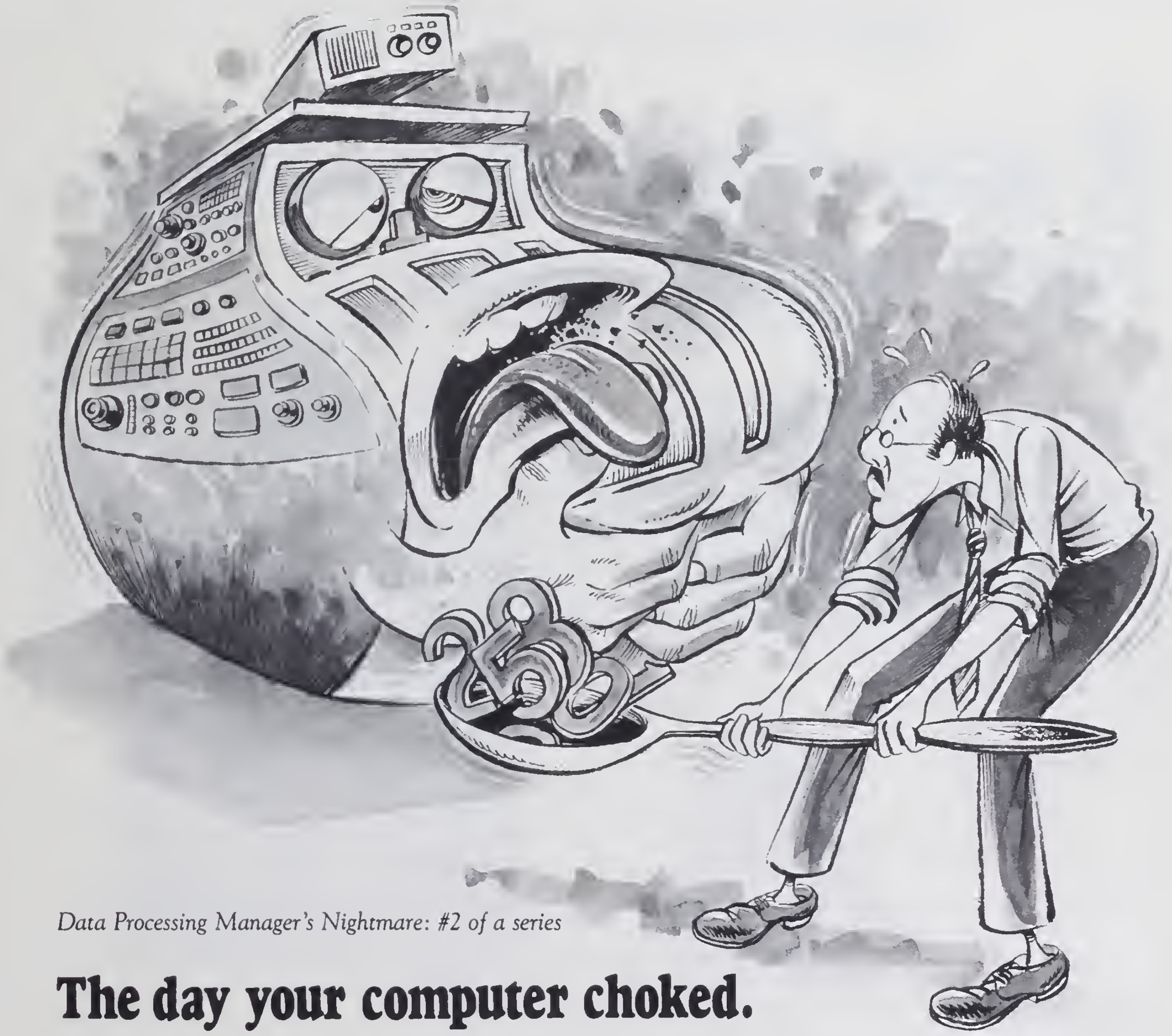
Registration for the miniconference costs $175 for Dema members and $195 for nonmembers, and the seminars cost $250. More information is available from Dema, P.O. Box 3231, Stamford, Conn. 06905.

# Health Forum Set for Spring

ALEXANDRIA, Va. — The National Forum on Computers and Health, which is sponsored by Health Information, Inc. and the Society for Computer Medicine, has announced three different two-day workshops to be held this spring.

"Management of Health and Hospital Computer Systems" will be held in Washington, D.C., on March 24-25 and in Nashville, Tenn., on May 12-13. "Systems Organization in Health and Hospital Information Management" will be held in Boston on April 27-28 and in Atlanta on June 3-4. "Minicomputers and Microprocessors in Medical Practice Management" will be held in Atlanta on April 8-9 and in Philadelphia on June 4-5.

Registration for the workshops costs $350 with reduced rates for additional persons attending from the same institution. More information can be obtained at the National Forum on Computers and Health, 621 Duke St., Alexandria, Va. 22314.



*Data Processing Manager's Nightmare: #2 of a series*

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# Larry Long's List of Professional Groups

- **Electronic Data Processing/Special Interest Group (EDP/SIG).**

*Purpose and objectives:* Originally formed as a special interest group within the American Society of Training & Development (ASTD), its purpose was a half day of programming at the annual national conference. The program has now expanded its services to include all DP educators, whether members of ASTD or not.

The objectives of the group are twofold. One is to make the DP educator aware of resource options, trends impacting education and peers with like interests. The second is to develop a professionalism in managing the DP education function.

Services include a bimonthly newsletter, resource references, papers and handouts, creation of local DP educator groups (more than 50) and programs to enhance peer contact.

A quite informal arrangement via the newsletter loosely binds together the approximately 100-plus present participants. There is no charge to participate. Persons responsible for any education in DP installations may receive this newsletter and participate further as desired by writing.

*For more information:* Roger Sullivan, Director, Education Department — MIS, Commercial Union Assurance Companies, One Beacon St., Boston, Mass. 02108.

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*Larry Long is compiling a list of professional DP/computer societies and organizations. His compilation, which started in the Dec. 22 issue, will be continued in future columns. To be included, societies and organizations should send a brief description of their purposes and objectives to Larry Long, Editorial Department,* Computerworld, *Box 880, Framingham, Mass. 01701.*

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- **Network of Women in Computer Technology (NWCT).**

*Purpose and objectives:* The purpose of this organization is to provide a supportive network for women in computer technology in order to maximize professional growth and long-term career development and to promote communication among its members.

Features of the network include guest speakers from all facets of the DP community, mini-workshops and group discussions on various topics of interest. Membership is open to any and all persons who support goals of the organization.

*For more information:* Carolyn Wood, Network of Women in Computer Technology, P.O. Box 22, Narbert, Pa. 19072.

- **Health and Beauty Aids Computer Users Society (Habacus).**

*Purpose and objectives:* Habacus aims to improve the use of computers and computer systems by the participating members of the proprietary drug and toiletries manufacturing industry through mutually beneficial exchange of nonconfidential information, to interpret the impact of proposed industry and government actions which may affect members' computer systems and to enable member companies to coordinate reaction where feasible. Membership is open to companies in the proprietary drug or toiletries industry which have integrated operations including manufacturing, marketing and distribution. Member companies have installed computer equipment and computer systems to service their internal business requirements.

Membership is limited to companies whose representatives are willing and able to discuss freely nonconfidential aspects of their systems with other members of the organization. Habacus has 42 member companies and meets twice a year at a New Jersey location.

*For more information:* Kathleen B. Jones, Habacus Recording Secretary, 750 Walnut Ave., Cranford, N.J. 07016.

- **Library and Information Technology Association (Lita).**

*Purpose and objectives:* Lita, a division of the American Library Association, provides its members and the information dissemination field as a whole with a forum for discussion, an environment for learning and a program for action on all phases of library use of technology.

Lita's primary concern is in three areas of information dissemination: library automation, educational technology and video and cable communications. Within those general fields, the division's interests include such varied related activities as electronic data processing, systems analysis, mechanized information retrieval, standards development, management techniques, video and audiovisual activities, telecommunications, information networks and the development of related hardware and software.

The division is comprised of three sections devoted to library automation, video communications and audiovisual activities. These units broaden Lita's sphere of interests and provide a strong organizational medium for the development of programs and activities on many aspects of communications.

*For more information:* Library and Information Technology Association, American Library Association, 50 E. Huron St., Chicago, Ill. 60611, (312) 944-6780.

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# Should DPer Get Predecessor's Pay?

## Turnaround Time
By Larry E. Long

**Q** I've made a great deal of progress over the last four years, but after three promotions and eight salary increases I feel like I'm being taken advantage of.

I was hired as a rookie computer operator in March 1977 at $10,000 per year. By February 1979 I was made lead computer operator at $13,500 per year. My superior got fired for inadequate performance and I got his job in September 1979 at $18,300 per year. The operations manager was laid off and I was given his post in June 1980 at $22,000 per year.

My gripe is that my predecessor was making $34,000 per year. Should I put up with this injustice and hope that by June 1981 my boss sees things the same way I do or should I go in right now and demand a raise? Should I start looking elsewhere?

**A** In order to allow for salary growth within a given position, promotions are routinely awarded at salary levels less than that of the predecessor. With limited information, I can't say whether or not the position is worth $34,000 per year, but I can say that $22,000 is a bit austere.

I'm not an advocate of the "demand." Your best approach is to build a convincing case for a substantial salary adjustment by documenting improvements in productivity, morale, throughput and so on.

Compile statistics that compare your salary posture to national and regional norms. Demonstrate a continuous effort at self-improvement (formal education, independent studies and so forth).

Present this package, without the threat of leaving, to the director of management information systems (MIS). If the situation is not resolved to your satisfaction within a reasonable period of time, I would recommend that you actively seek employment elsewhere.

It is conceivable that your meteoric rise was accomplished by age 23 with no postsecondary education. The mobility of even the most capable managers is stifled by youth and lack of formal education.

The limited demand for persons in this category may be the basis of your seemingly low salary. This is not right, but that's the way it is.

**Q** I've recently accepted another controller's position that has expanded responsibilities over my last position. My responsibilities now include a computer center that was billed as one of the best in our industry. If this is the best, I pity the company that has the worst.

We have two IBM System/3s. All of our systems are batch and are peppered with redundancies and inaccuracies. Controls are almost nonexistent. I will admit that it's better than what I left, but is this all there is?

**A** Of course not. Existing corporate management is obviously unaware of the potential of information services.

You are traveling eight miles per hour on a highway that allows you to travel 55. I would recommend that you seek knowledgeable assistance from outside the company.

**Q** I am presently employed as a computer consultant for a firm. While on one of my accounts, I came in contact with a man who was certified in computer audits. I am interested in finding out what it takes to be certified and how one goes about getting certified. I have tried our local colleges and no one seems to know what or how to do it.

I hope you will be able to shed some light on a very interesting subject.

**A** The EDP Auditor's Foundation, Inc. will administer the first Certified Information Systems Auditor examination on April 10. The examination will be offered in about 20 U.S. cities and four abroad.

The content of the six-hour examination is taken from the following job areas: application systems control review, data integrity review, system development life cycle review, application development review, general operational procedures control review, security review, systems software review, maintenance review, acquisition review, data processing resource management review and information systems audit management.

Those desiring more information should contact the EDP Auditors Foundation, Inc., 373 S. Schmale Road, Carol Stream, Ill. 60187.

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*Long is a professor at Lehigh University, a DP consultant and author.*

*Have a question? Send it to Larry Long, Editorial Department,* Computerworld, *375 Cochituate Road, Box 880, Framingham, Mass. 01701.*

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# Engineers Ride Play Train . . .

By Lois Paul
CW Staff

ALBANY, N.Y. — Adults here are playing engineer with a computerized device that lets them experience the sensation of running a train.

This is not a video game in an amusement arcade. The users are actual train engineers, and the device is a Train Dynamics Analyzer (TDA) that Conrail is using to instruct novice engineers and to help experienced railroaders sharpen their train-handling abilities.

Conrail has been using the TDA since 1977 as part of its regular training program, according to Larry Esterline, who has spent the last nine months traveling to various railroad yards with the TDA installed in a mobile home. He parks the mobile home near the yard office at each location he visits and employees are free to wander in and out at will to use the TDA.

Esterline is not a computer specialist who is trying to tell train engineers how to do their jobs. Rather, he is a former engineer and training instructor.

## Computerized Analyzer

Conrail is leasing the TDA from Freightmaster, Corp. in Fort Worth, Texas, which developed it in 1975 for impact testing, according to J. Grady Frizell, senior service engineer. Frizell said the TDA is very close to a simulator, but is essentially an analyzer. It uses an actual locomotive control stand, including throttle, speedometer, brake pressure gauges, ammeter and brake controls.

The TDA consists of a Computer Automation, Inc. LSI-2 minicomputer with 16K-byte core memory. It interfaces with a Kratos Display Systems, Inc. CRT terminal and a Teletype Corp. Model 33 terminal, Frizell said. It displays gravitational force in a graphics form, he explained.

An engineer sits at the TDA controls, and the CRT displays a continuously moving set of lines and graphs showing the length of the train, how much air brake pressure is being applied on each car and where the bunching-up and stretching-out is occurring and with what degree of severity.

## Any Combination

Esterline said the TDA can be programmed for any combination of train makeup and route. This is important, he explained, because the physical forces within a moving freight train are far greater and more numerous than most people realize.

For example, there are three sets of brakes. A freight train can be 1-1/3 miles long and an air brake application feeds gradually through the string of cars. Too much brake at the head of the train can make heavy cars near the rear ram into the front. If an engineer accelerates too quickly when the brakes at the rear have not released fully, the couplers could be pulled out of their pockets.

The Train Dynamics Analyzer is housed in a mobile home that is moved to various railroad yards. The analyzer simulates in graphics form on the CRT the gravitational force involved.

How Iowa State University's long term computer strategy solves their problems today.

One of the most difficult problems faced by computer centers is planning for future needs, while at the same time meeting today's skyrocketing demands.

But some universities, like Iowa State, have found a simple, practical solution. Distributed processing with Digital. Thanks to Digital's broad line of compatible minis, superminis, and mainframes, they can add and reassign computers as needed.

**Distributed processing with Digital means more students get more time on more terminals.**

To solve one of their biggest problems—availability—Iowa State bought one of Digital's VAX systems in 1978. The VAX-11/780 gave them the ability to connect 64 interactive terminals to one computer, which they spread out among various math, engineering and science departments. Then when funds became available, they added another VAX-11/780 and 64 more terminals, including several in special dormitory rooms.

"Until we acquired the VAX systems," says Dr. Clair G. Maple, Computer Center Director, "Iowa State was not providing enough accessibility to our students. We wanted to get into an interactive, distributed environment, and the VAX-11/780, with its 32-bit architecture, gave us a lot more power than a standard mini.

"We also look at the VAX system as more than just an object of study, we see it as an educational tool," says Dr. Maple.

The VAX-11/780 is a natural for teaching computer science. But it's so simple and so widely available, just about every department is using it—no matter what level of understanding the students have.

Dr. George Brant from the College of Agriculture explains, "We have a program that teaches students to estimate the amount of meat they'll be able to sell from a steer carcass. The program is already written, so the students simply follow the program sequence, prompted by the system each step of the way. If the student enters an incorrect answer, the computer instantly tells him he's wrong. That way the students get a better understanding of the problem, and can keep on working until they get it right."

Of course the VAX-11/780 is also used for extremely complex computations in departments like mathematics, engineering and aerospace. And it's been a tremendous tool in those departments as well.

**Distributed processing with Digital means an introduction to the real world.**

According to Dale Anderson, Prof. of Aerospace Engineering, the university's combination of a mainframe supplemented with VAX systems

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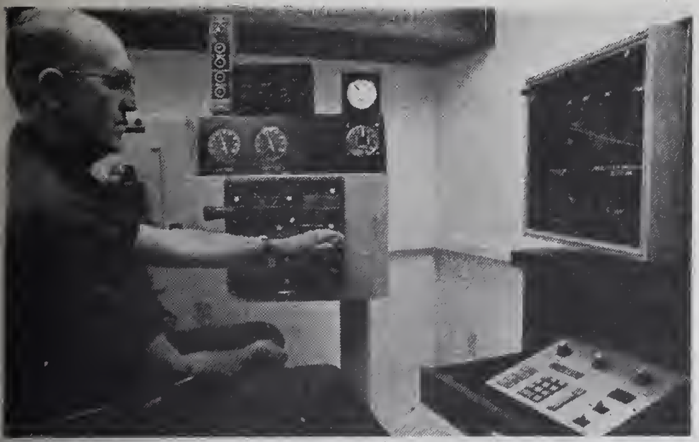

Using a locomotive control stand, which includes a throttle, speedometer, brake pressure gauges, ammeter and brake controls, the TDA lets train engineers try out problem areas.

# . . . To Pick Up Experience

The TDA displays characteristics of each particular route, noting the steepness of grades, sharpness of curves, the positioning of heavy cars and empty cars in a train and the horsepower and braking capacity of the locomotive.

Esterline said the TDA is particularly useful in showing engineers how to deal with rough train-handling areas. "On the equipment, we can't hurt anything or derail anything, so we can show the wrong way to negotiate an area and then start over and show the proper way," he said.

## Student Training

According to Esterline, about 60 to 70 engineers per month use the TDA and about half of these are students. Train engineers spend a one-year stint as firemen or assistant engineers and then receive six weeks of classroom training. The TDA is used during this period to give students the feel of running a train themselves.

After they have had on-the-job experience as student engineers, they return to the TDA for another day before beginning work on their new track assignments, Esterline said.

He said the younger engineers and firemen show the most interest in the TDA "because they are still eager to learn and willing to change their ways. They may have been operating under some false assumptions."

Having this device to demonstrate visually the best way to operate trains can result in less damage and loss of time and equipment, Esterline said. "If someone is operating through a given difficult train area the wrong way time after time, there may be damage to the equipment or, even worse, a derailment," he explained.

One derailment can cost thousands of dollars, Esterline said, adding, "If we can eliminate just one, it would pay for our TDA for a long time to come."

# 'Pars' Revamped To Combine Two Packages

DARIEN, Conn. — The Performance Appraisal Reporting System (Pars), a monthly reporting service that measures DP departments' performance, is being revamped to consolidate two individually priced packages into one, according to the vendor, Mathews & Co.

The Summary Service package is being integrated with an expanded Detail Service package to simplify the procedures for subscribing companies, the vendor said.

Pars was designed to measure the performance of DP departments by having those who use their services fill out reports on the basis of specific performance criteria. These forms are then processed monthly by Mathews & Co.

The new Pars package costs between $1,000 and $7,000 depending on the options. More information is available from Mathews & Co., P.O. Box 2064, Darien, Conn. 06820.

and more than 40 other minis from Digital gives students a better feel for computers used in the real world.

"We had little distributed processing here until Digital. With the VAX-11/780, students are using terminals interactively to study aerodynamics, structural dynamics and propulsion. Not only do they learn faster that way, they're better prepared for jobs in the real world when they leave college."

"No matter how the system is used," says Dr. Maple, "the students are finding that the VAX-11/780 is very easy to operate. It's had tremendous acceptance to the point that, now, in a peak month, 38,000 log-ins have been recorded, averaging more than 40 minutes each."

The Iowa State story is just one example of how Digital is committed to making the computer a practical, economical and accessible tool for education. We offer the world's broadest and most widely used family of educational computers—from entry-level minis to 36-bit mainframes. Plus the networking tools to tie them together.

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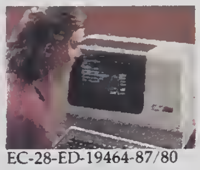

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## Diebold to Keynote

NEW YORK — John Diebold will give the keynote address on "Managing Information as a Resource" at the 11th Conference on Computer Audit, Control and Security sponsored by the EDP Auditor Foundation and the Automation Training Center to be held here May 4-8.

The five-day conference includes 13 two-day tutorial sessions, nine half-day sessions, three general sessions and a series of talks.

Registration costs $695 or $595 if more than one person attends from the same organization.

More information is available from the Registrar, EDP Auditors Foundation, P.O. Box 2051, Winter Park, Fla. 32789.

# Registration Renewal Foul-Up Grants Pa. Car Owners Reprieve

By Lois Paul
CW Staff

HARRISBURG, Pa. — About 30,000 car owners here, who were chewing their nails because a computerized mailing list failed to send them their registration renewal forms, were granted a reprieve from the Feb. 28 deadline by the Pennsylvania Department of Transportation (Penndot.)

According to Joyce Tomana, assistant press secretary for Penndot, those scheduled to renew their automobile registration at this time who have not received forms because of the foul-up have been sent letters of apology. These letters explain the problem and act as a temporary registration until March 31.

Tomana said the mailing also included a renewal form and that the Penndot mailing unit has been alerted to keep special watch for the return of these registrations from people in counties with Zip Codes that begin with 18.

The breakdown took place somewhere between a computer which produces the mailing list for renewal forms, and the card-punch, which yields the registration cards, Tomana said. Apparently, the mailing list was completed, but no cards were mailed out for motorists in 16 eastern Pennsylvania counties.

### Who's Responsible?

Penndot has not yet determined who was responsible for the oversight. The forms should have been mailed in late December to meet the Feb. 28 deadline. Tomana said she is fairly certain it was a human error, not caught until early February, that caused the problem.

Initially, Penndot alerted affected car owners through the media and urged them to obtain the necessary forms from local auto tag messengers, notary publics, automobile clubs or the state Bureau of Motor Vehicles. Penndot stated at that time that an extension of the Feb. 28 deadline would not be granted.

Since then, the company decided that a mailing to the motorists involved would be a more certain way of rectifying the situation, Tomana said. The Feb. 28 deadline still has not been extended, she said, but the 30,000 car owners who did not receive their forms are covered by the temporary registration until March 31 to give them time to have their regular forms processed.

## Seminar to Cover Surge Protection

MADISON, Wis. — A three-day seminar on "Surge Protection of Telecommunications Systems," organized by the University of Wisconsin-Extension, will be held here June 15-17.

The sessions are intended for field-service personnel concerned with the protection of equipment used in environments exposed to externally induced overvoltages. Attendees are expected to participate by bringing design examples which have or have not proved effective in protecting equipment.

Registration costs $280 and more information is available from Francis Drake, Department of Engineering and Applied Science, University of Wisconsin-Extension, 432 No. Lake St., Madison, Wis. 53706.

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*Not yet available for Burroughs MiniDisk II, Vydec or 96 TPI Drives.*

*A Scotch cleaning diskette shown before use and after 15 cleanings of recording heads.*

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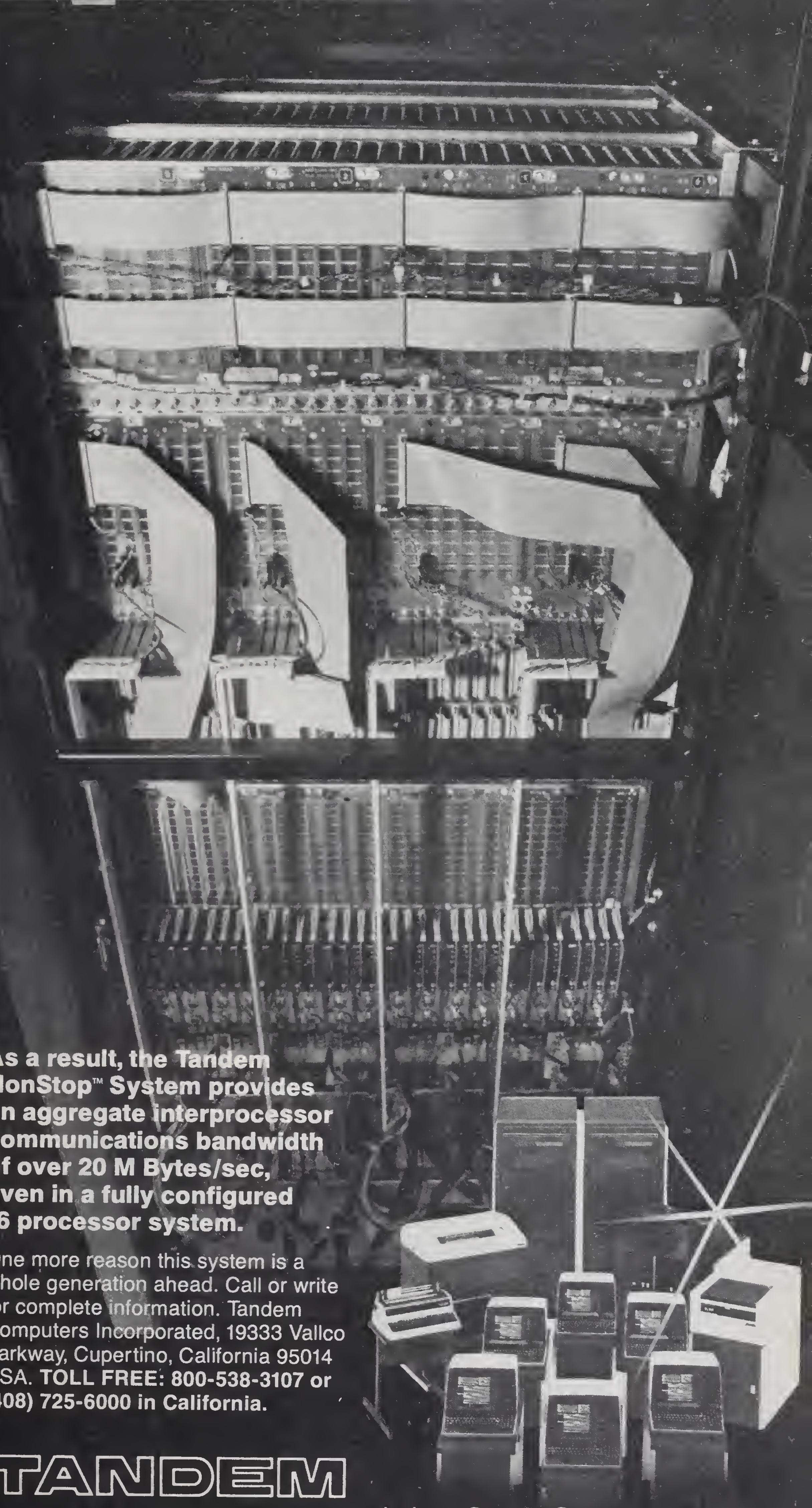

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## *As Hardware Prices Drop*

# Advances Seen Spurring Wider Use of Graphics

By Bob Johnson
CW New York Bureau

NEW YORK — The use of high-speed laser printers as graphics devices, coupled with recent price breaks in hardware, should give many more companies the ability to use business graphics, according to Alan Paller, president of AUI Data Graphics.

Speaking at a recent seminar here sponsored by the National Computer Graphics Association (NCGA), Paller cited the high cost of hardware, low print quality, dependence on programmers and the lack of user demands as the barriers that have restricted use of computer graphics.

He noted, however, that the situation is changing. The cost of plotters has dropped nearly $25,000 since 1965 and the cost of CRTs has dropped much faster since then as has the price of slide makers.

### Further Justification

As further evidence for justifying the purchase of graphics equipment, Paller noted that users can have a color graphics terminals connected to an IBM mainframe for $60/mo more than the price of a standard terminal. They can buy a color graphics system for about $3,500 or add a color plotter to any standard CRT for only $300/mo.

With the advent of alpha terminals that offer graphics capabilities; the use of laser printers such as the Xerox Corp. 9700, 5700 and 6500 CGP; the promise of numerous Japanese entries; and a new announcement from Hewlett-Packard Co., business graphics will be coming on strong in 1981 and '82, Paller indicated.

"Business graphics is hot. I don't know of a single major corporation that hasn't already installed a business graphics system . . . or if not, it has a business graphics study group to figure out what to do," he said.

Another important part of the graphics world, according to Paller, is the tie-in with office automation. With the appropriate software in the mainframe, computer graphics output can be previewed on any ordinary CRT terminal or communicating word processor, he noted.

As far as management is concerned, financial executives who authorize DP expenditures are now demanding business graphics because they are finding that they can absorb information four or five times faster, Paller observed.

"This is the first time I've seen management information systems giving top executives something that saves them time *personally*," he added.

The future of business graphics, according to Paller, will lie in intelligent terminals, pressure-sensitive screens, three-dimensional pointing and continuous voice recognition.

# SMIS to Sponsor D.C. Area Meet

ROSSLYN, Va. — The Capitol Area Chapter of the Society for Management Information Systems (SMIS) will sponsor a workshop on information resource management here on April 14.

As part of the session, Reed Phillips, director of the Office of Information Resource Management at the Department of the Interior, will discuss his department's implementation of the Paperwork Reduction Act of 1980.

The workshop costs $17.50 for SMIS members and $20 for nonmembers. More information is available from the Capitol Area Chapter, SMIS, P.O. Box 155, Merrifield, Va. 22116.

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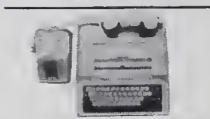
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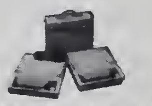
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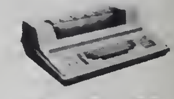
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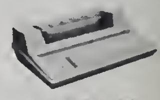
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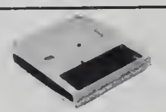
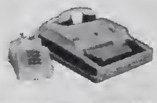
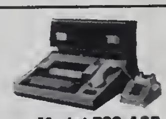
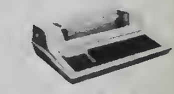

Model 781 RO

Model 820 KSR


Model 765 Portable*


Model 733 ASR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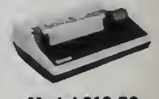
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# NonStop™ Network

**8** Unique network system architecture of a series

**The goal: NonStop™ operation in an on-line network.**

The network must be able to handle the loss of any critical element without loss or duplication of any transaction in progress and without damage to the data base. Applications must be able to run anywhere and access devices and files anywhere in the system without having specific knowledge of physical location. In fact, the entire network must look like a local resource to every user. This requires complete geographic independence.

**The solution: build on the right foundation. Every Tandem system is effectively a local network comprising two or more processors.**

So even the minimum system is already a complete, true distributed processing NonStop™ network. A unique message system at the heart of every system controls communications among processors. Networking software simply increases the scope, to allow communications among as many as 255 separate Tandem systems—each ranging in size from two to sixteen processors. To the user, Tandem's network, EXPAND, appears as a single set of computer resources rather than a collection of individual systems.

**The result is something totally new in on-line transaction oriented systems: the ability to deal with a remote program, a remote processor, a remote terminal, even remote data as if it were right at the users' fingertips.**

Since programs can access devices and files anywhere in the system without having specific knowledge of physical location, the development of applications can be identical for single or multiple system environments. A request for information may originate from any node and that same request can be run on any other system in the network without the need to modify it in any way. And it is incredibly easy to learn. Since the network uses the same inputs and procedures as the minimum individual system, there is no need for special training manuals, classes and the uncertainty which accompanies other systems when updating from a single system to a network operation.

The EXPAND network gives users the flexibility to build a network that supports their business and not have to shape their business to the network. Users can place exactly the right amount of computing power at each site.

As computing requirements grow, they can add memory, processors or peripheral devices to any site and still retain total compatibility of operating system, data and applications programs.

**In fact, nodes consisting of 2 to 16 processors can be added or removed and communications paths altered, all without recompiling or changing a single line of code in existing application programs.**

Another reason Tandem is a whole generation ahead. Call or write for complete information. Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014 USA. **TOLL FREE: 800-538-3107 or (408) 725-6000 in California.**

TANDEM

**A whole generation ahead**

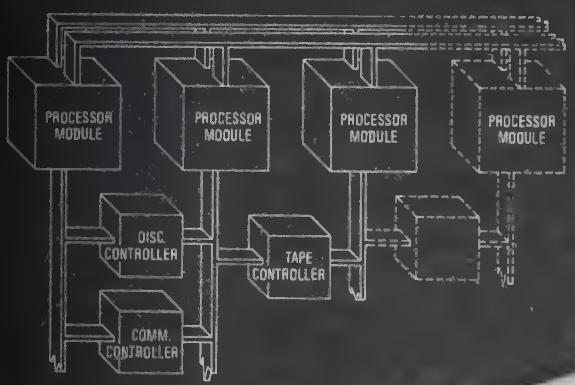

Photo: NASA

## *More Than 100 Customers*

# Joint Venture Tests Home Banking Waters

By Lois Paul
CW Staff

KNOXVILLE, Tenn. — In between wrapping gifts and decorating the tree this past Christmas, two people here installed home computers and helped launch what they said is the first computer-based home banking service in the country.

They were the first two customers of the Express Information bank-at-home service, a joint venture of United American Service Corp. (Usac); Radio Shack, a division of Tandy Corp.; and Compuserve, Inc., a subsidiary of H&R Block. The United American Bank (UAB) here, an affiliate of Usac, was selected as the first bank to use and market the service.

Since then, UAB has installed about 100 customers in the new service, according to James W. Fouche, sales and marketing manager for Usac. For $650, the customer purchases a Radio Shack TRS-80 microprocessor with an attached full-Ascii keyboard, which can be used with the customer's own television set and telephone.

The customer pays a $5 monthly fee to the bank for the service. Currently, it includes a news and information network developed by Compuserve. Customers can choose information from a list of national, international and financial news, including the latest stock quotation and commodities information.

Also included is information on the bank's new services and the Express Statement, which shows all of the customer's activities since the last statement. The customer can see what items have cleared. For example, the customer can verify that direct deposit social security checks have reached his account without having to physically go to the bank. Deposits and withdrawals still must be handled at the branches or through the mail, however.

### Pay by Phone

An Express Tel-A-Pay component enables customers to pay bills using their home computers. They establish a special file with the bank, which lists the merchants they will be paying and assigns them a number.

The customer basically authorizes the bank to pay specified amounts to certain merchants from his account. Customers also can indicate that some bills are to be paid later in the month. Each payment must be personally authorized.

Fouche said that future phases of the service will include bookkeeping, tax services, electronic mail and loan applications.

The Express Information bank-at-home service is connected through an IBM 3705 front-end communications controller to Usac's host computers, an IBM 3031 with 3M bytes of memory and a recently added IBM 4341 with 4M bytes of memory. Usac has 6,350M bytes of IBM 3550 disk storage capacity.

(Continued on Page 36)

NO MEMORY PARITY?
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The difference between a "hobby" computer and a "professional" system can mean the difference between success and failure when accuracy and dependability are at stake.

For example, professional computers go to the extra expense of adding memory parity. This feature uses an extra 64K Bits of RAM to monitor the condition of the computer's memory banks. When a memory chip malfunctions, the memory parity watchdog immediately identifies the malfunction without losing data integrity.

In "hobby" computers without the memory parity feature, a memory error goes undetected often causing the program to "walk" all over the customers data files. To a hobbiest such problems are an interesting challenge to test his skill. To the businessman, they are expensive and intolerable.

All **Billings Computer Systems** have been designed for professional applications. Every machine has full memory parity capabilities. These features cost a little more, but we believe that a few dollars invested in good equipment will result in substantial savings for years to come for the serious computer user. If you would like to know more about **Billings** quality products please contact us today.

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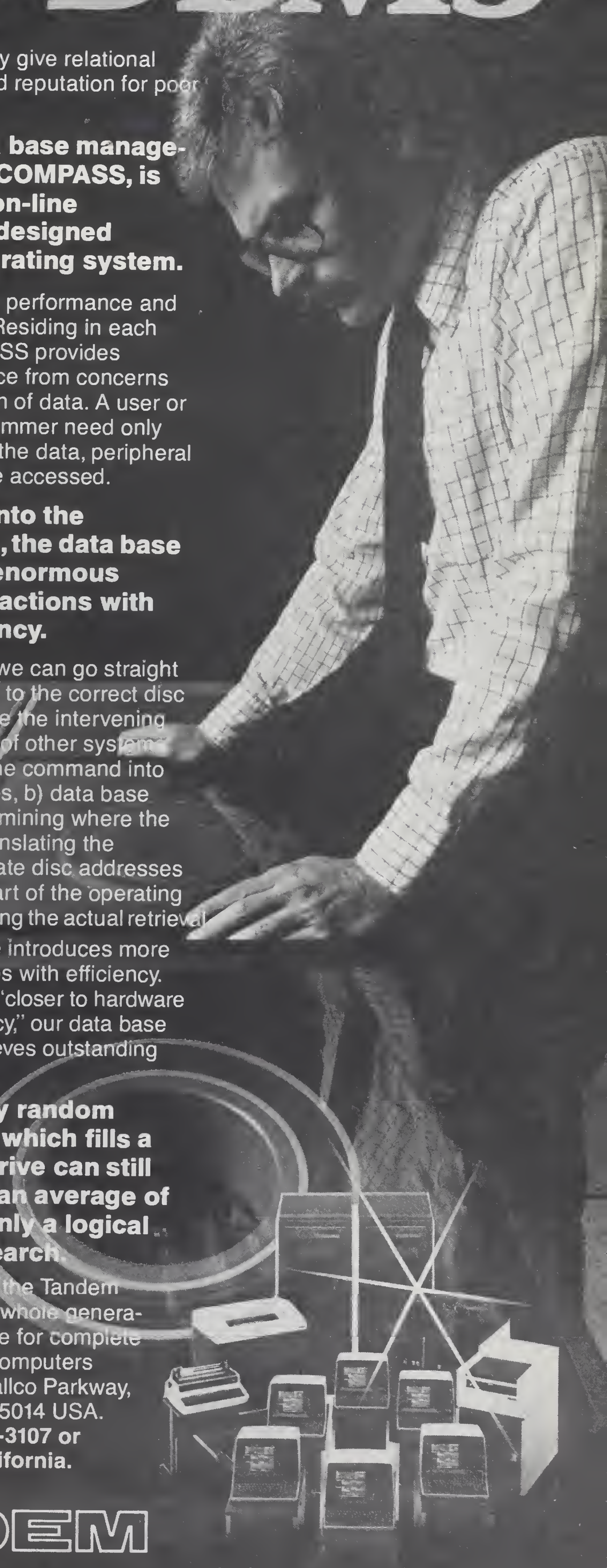

# NonStop™ DBMS

**5** Unique capabilities in a relational data base of a series

## The challenge: NonStop™ operation in an on-line environment.

To design a fault tolerant system (no single points of failure) requires a multiple processor environment and thus a distributed system. Programs must be able to run anywhere and to access data anywhere in the system without specific knowledge of physical location. In the event of a failure, system loads must be redistributed dynamically without changing application software. All this whether the application is running in a single multiple processor system or in a multi-node network. Nothing less could assure availability of all resources through an otherwise crippling failure.

Consider the burden facing data base management in such an environment.

## Users must be able to distribute a data base not only across multiple processors, but also across multiple systems in a network.

If the data base model is dependent on hard coded pointers within the files, updating all these pointers is a nightmare. The problem is compounded if any one remote location is not available at the time of an update. Without concurrent access, the state of the data base is potentially inconsistent.

These pointer problems make both hierarchical and network data base models inflexible and difficult to modify. When the requirement to move files and applications among processors and among systems is coupled with the need to maintain the ability to transparently access the data base from any point in the network, the problems become staggering.

## The solutions are in the relational data base model.

A relational data base is a collection of data items represented logically as two dimensional tables. Files use logical fields within records as their only required linking mechanism. Users need not be concerned about details of structure, only about the logical relationships which exist between files. This simplicity and the ease of use inherent to relational data bases has been obscured historically by attempts of vendors to shoehorn or add on relational structure to a conventional operating system. The results are laboratory curiosities, interesting but cumbersome, and they give relational models an undeserved reputation for poor performance.

## The Tandem data base management system, ENCOMPASS, is the world's first on-line relational DBMS designed right into the operating system.

It is optimized for high performance and NonStop™ operation. Residing in each processor, ENCOMPASS provides complete independence from concerns about physical location of data. A user or an applications programmer need only know the file name of the data, peripheral device or system to be accessed.

## Fully integrated into the operating system, the data base system handles enormous numbers of transactions with speed and efficiency.

Using ENCOMPASS, we can go straight from "Read Record A" to the correct disc without having to utilize the intervening software steps typical of other systems: a) DBMS translating the command into appropriate instructions, b) data base access methods determining where the data is located and translating the instruction to appropriate disc addresses and c) I/O services, part of the operating system, finally performing the actual retrieval.

Every level of software introduces more overhead and interferes with efficiency. Following the principle "closer to hardware equals greater efficiency," our data base operating system achieves outstanding performance:

**In normal use, any random record from a file which fills a 300 M byte disc drive can still be retrieved with an average of one seek, using only a logical key to start the search.**

One more reason why the Tandem NonStop™ System is a whole generation ahead. Call or write for complete information. Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014 USA.
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NonStop™ Systems

# Joint Venture Tests Computerized Home Banking

*(Continued from Page 34)*

The software, which links customers' home computers with the bank's account files, was prepared by Usac.

Customers naturally can use their home computers to program their own on-line applications and to play electronic games with their children, Fouche said, adding that the bank-at-home services are an added plus.

"We have been very pleased with the response," Fouche said. Each unit that is installed includes the name and telephone number of Gerry Taylor, marketing project manager at UAB. Taylor recently received seven calls one Monday morning from customers who had used the system over the weekend and wanted "to chat" and offer ideas and general comments.

Customer suggestions have led to several modifications of the program, Fouche said. Originally, the express statement did not list check numbers because of size limitations, but listed checks sequentially. However, customer feedback noted the need for check numbers and the change was made.

An initial goal of the program was to have 400 customers installed within the first six months, Fouche said, adding, "The best way to sell this system will be by word of mouth and satisfied customers." He explained that there always is a certain percentage of the market that is innovative and willing to try new ideas. These people now are sending their friends to the bank to purchase the system, Fouche said.

The bank has demonstrations of the system at all of its branches. Often customers who were frightened off by the thought that they need to be programmers to use the system realize this is not at all the case when they see it at work, Fouche said.

He said the participating companies have a commitment to the home banking concept and this program is not merely a test. He suggested a growth of the use of this type of system as home computers become more affordable.

## Boston to Host ICL Convention On April 22

ROLLING MEADOWS, Ill. — Computer users worldwide will gather in Boston on April 22 for the three-day convention of the International Federation of International Computers Ltd. (ICL) Computer Users Association.

The convention, to be held at the Copley Plaza, is expected to attract representatives from several countries and will feature reports from each of the member countries giving a brief overview of their organization and activities, according to Forum International, which will host the meeting.

Further information on the convention is available from Forum International, 4300-L Lincoln Ave., Rolling Meadows, Ill. 60008.

## ICP Schedules Two Conferences

INDIANAPOLIS — International Computer Programs, Inc. (ICP), a publisher of software product and service information, is holding its tenth annual Million-Dollar Awards Ceremony and Executive Conference in San Antonio, Texas, from April 15-16 and in London on May 12.

The Awards Ceremony recognizes and honors the industry's outstanding achievements. The Executive Conference offers workshops and roundtable discussions on topics such as advertising and promoting software, finance, sales and software protection.

Attendance at both conferences costs $225. More information is available from ICP, 9000 Keystone Crossing, Indianapolis, Ind. 46240.

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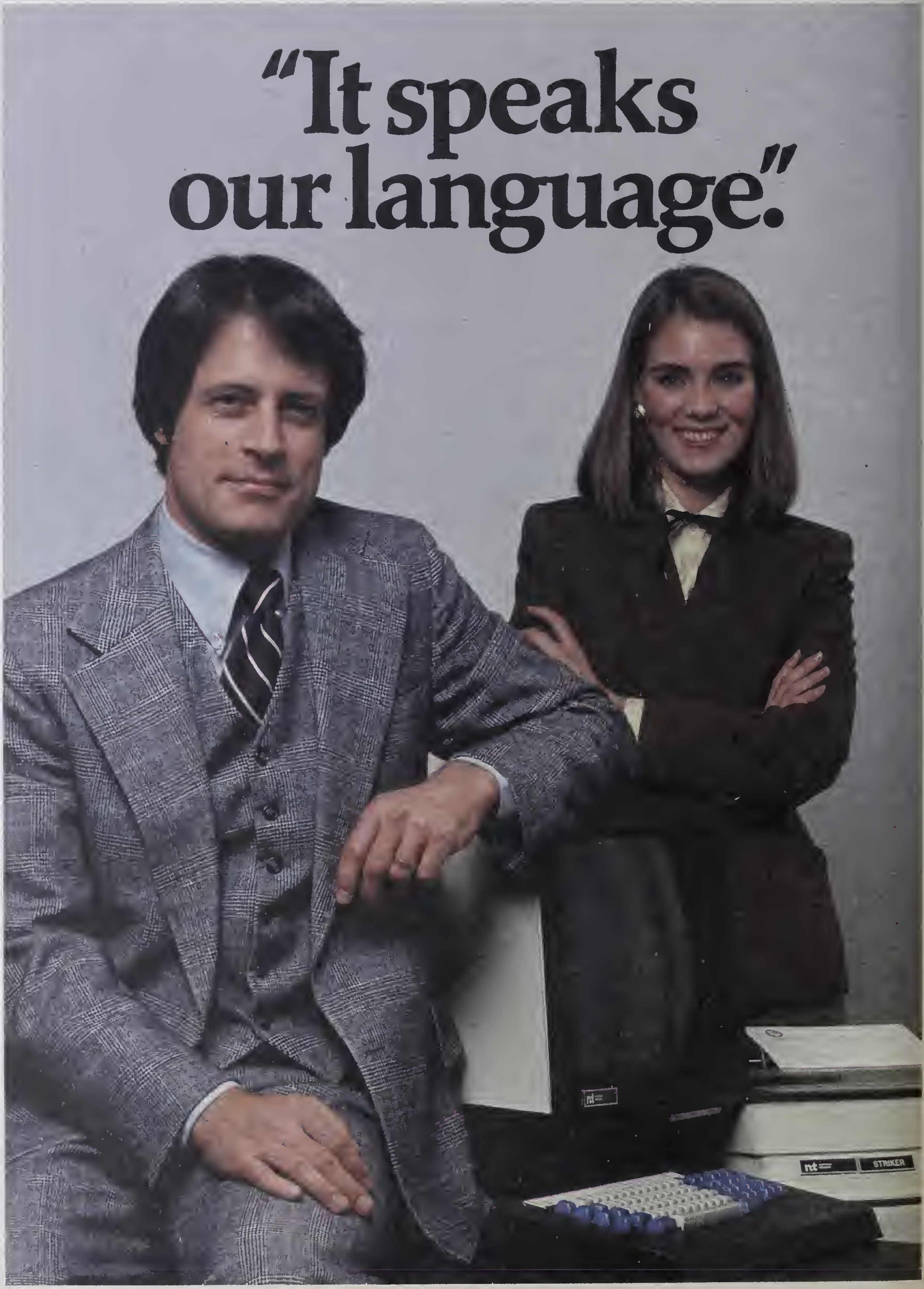

## *In Urban Planning Course*

# Students Take Reins of CPU-Resident 'City'

By Deborah Wise
CW Staff

LOS ANGELES — Apex City, population 250,000, is run by 150 University of Southern California (USC) students who make policy decisions, plan budgets, provide services and monitor their results over a five-year-period — all in the course of one semester.

The city exists in the university computer. Those students who enroll in "Public Administration 220 — Simulated Policy Making in Urban Systems: Theory and Practice" assume the roles of the city's decision makers and try to govern Apex City.

The program, now used in more than 100 colleges in the U.S. and seven foreign countries, was developed in 1974 by researchers at the University of Michigan and USC. The data base was established by combining several environmental and urban planning prediction models which were then enlarged over the years to create a comprehensive information base on which a city's governmental decisions could be based.

"They linked these models so as to demonstrate their cross-impact effect," explained Dick McGinty, executive director of USC's Center for Multidisciplinary Educational Exercises (Comex) and a class instructor.

### Strategies as Input

At the beginning of the semester, the students assume roles as politicians, urban planners, environmentalists, journalists or members of different interest groups. They attend lectures on various policy theories and then devise their own strategies for Apex City. The instructors input these strategies into the computer at the end of class. Each class session represents one year in the life of the city.

At the beginning of the next class, the computer generates a printout newspaper called *Metro-Apex News* that reports the impacts of the previous year's policies.

For example, if the budget was cut, there may be a headline in the paper to the effect that crime rates have risen because of the decrease in number of police. Through the process, students become aware of the tertiary effect of their policy decisions as well as such immediate impacts as financial crises, McGinty said.

This method of practical application of theoretical principles has proved successful at USC, he maintained, noting that students become more involved in the class when they can actually influence the direction of the city's administration.

### Civics Course

"The course is a basic and valuable civics course that teaches students how to become effective citizens and public administrators by producing hands-on experiences," McGinty said.

Government agencies such as the Department of Trade and the Department of Defense have used the simulation program to test prospective policies. However, McGinty said its use in the classroom is intended less for formulating predictions than for getting the students involved in running a city.

The program was written in Fortran and runs on IBM 360 mainframes, but it can be adapted to other systems, according to McGinty. In additon, it can be used in various configurations for different classes. At Cornell University, for example, students themselves put the information into the computer and vary the programs.

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# Martin, Hopper to Address Auditors' Meet

ALTAMONTE SPRINGS, Fla. — A five-day conference keynoted by computer consultant James Martin and offering more than 40 sessions on different aspects of information systems controls will be presented by the Institute of Internal Auditors, Inc. (IIA) April 27-May 1 at the Sheraton-Centre Hotel in New York.

Other speakers will include Captain Grace M. Hopper, author of many books and papers on software and programming languages during her career in business and with the U.S. Navy, who will lecture on "Future Possibilities," and Don Parker of SRI International, who will address the subject of an auditor's perspective of computer crime.

"We are anticipating attendance by nearly 750 corporate, service, governmental and university representatives and have designed a full series of technical and problem-solving programs to provide appropriate sessions for participants with either low, medium or high levels of expertise in the field of information systems," said Lee F. Haynes, IIA director of advanced technology and education.

The conference will also feature industry presentations and discussions that focus on such fields as manufacturing, insurance, banking, retailing and state government, according to the organizers.

Registration costs $645 for IIA members and $695 for nonmembers, an IIA spokesman said.

More information is available from the Institute of Internal Auditors, Inc., P.O. Box 187, Maitland, Fla. 32751.

## IIA Staff Expanded

ALTAMONTE SPRINGS, Fla. — New technology and new regulations in the field of internal auditing have led to the expansion of professional management staff at the Institute of Internal Auditors, Inc. (IIA), an association with 22,700 members in 86 countries.

Lee F. Haynes, a former director of systems support for the B.F. Goodrich Co., has been appointed to the newly created position of director of advanced technology and education. He will coordinate educational programs and research to help IIA members keep in touch with state-of-the-art developments.

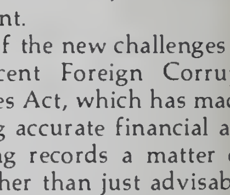
So far the institute has planned five seminars for this year including the five-day conference in New York April 27-May 1 that will discuss the varying facets of internal auditing.

"The realignment of our international headquarters executive group will enable us to develop and offer state-of-the-art professional development education specifically tailored to help the internal auditor in meeting the new challenge of the '80s," said Stanley C. Gross, IIA interim president.

One of the new challenges is the recent Foreign Corrupt Practices Act, which has made keeping accurate financial accounting records a matter of law rather than just advisable for management purposes. The IIA is developing programs to help internal auditors cope with the new regulation.

Other appointments include John P. Dattola as director of research and Samuel L. Newman as the coordinator of seminars to help internal auditors. He is presently upgrading the institute's seminar on the use of statistical sampling and developing related home study packages for members' use.

The institute is also looking for two more information systems educators to join the staff and a director to develop the IIA's program of college and university relations.



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# Calendar

April 10, Warrensburg, Mo. — Midwest Regional Student Data Processing Conference. Contact: Mel Franz, Dockery Hall, CMSU, Warrensburg, Mo. 64093.

April 12-15, Boca Raton, Fla. — Strategies of Office Systems. Contact: Eileen O'Brien, Conference Administrator, International Data Corp., 214 Third Ave., Waltham, Mass. 02254.

April 12-15, New York — Sixth Annual Nacha SurePay Conference — The Challenge of Change. Contact: Karen Reed, Nacha, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

April 13-15, San Francisco — Data Base Management Systems: A Comparative Analysis. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held April 29-May 1 in Washington, D.C.

April 13-15, Boston — Controlling Data Base Implementation Costs. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held April 22-24 in New York.

April 13-15, Dallas — Effective Computer Operations Management. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held April 22-24 in Washington, D.C.

April 13-15, San Francisco — DP Auditing and Control: An Introduction. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held April 22-24 in New York.

April 14-15, Chicago — SAS Two-Day Basics Course. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511. Also being held April 30-May 1 in Montreal.

April 14, College Park, Md. — Thinking Processes in the Systems Development Process. Contact: Laverne Papian, Center of Adult Education, University of Maryland, College Park, Md.

April 14, College Park, Md. — Understanding Computer Graphics. Contact: Laverne Papian, Center of Adult Education, University of Maryland, College Park, Md.

April 14-15, New York — Integrating Business Machines Into Local and Intercity Networks. Contact: Marjorie Sugarman, The Yankee Group, P.O. Box 43, Harvard Square, Cambridge, Mass. 02138.

April 14-17, Boston — Structured Systems Design. Contact: Ken Orr and Associates, Inc., 715 E. Eighth, Topeka, Kan. 66607.

April 14-16, Washington, D.C. — Seventh Annual 'Federal DP Expo'. Contact: Federal DP Expo, 160 Speen St., Framingham, Mass. 01701.

April 15, Boston — Selecting and Using Business Minicomputers. Contact: Carol Bell, MIC, 140 Barclay Center, Cherry Hill, N.J. 08034.

## Personal Computing Programs Sought to Aid Handicapped

LAUREL, Md. — A nationwide search for ideas and inventions through which personal computing may be used to aid the handicapped is now under way. The search is sponsored by grants from the Radio Shack division of Tandy Corp. and the National Science Foundation.

Entrants in the competition conducted by Johns Hopkins University are eligible for awards which include a $10,000 grand prize given by Radio Shack, a TRS-80 and other prizes.

Computer-related ideas, devices, methods and programs to help handicapped people overcome difficulties in learning, working and successfully adapting to home and community settings are the objectives of the search.

Paul L. Hazan, director of the Personal Computing to Aid the Handicapped project at Johns Hopkins, said that entries are being sought from computer specialists and professionals, full-time high school and college students and amateurs or interested people, including those with handicaps.

Contestants have until June 30 to prepare and submit entries. National awards will be presented at a banquet this fall in Washington, D.C.

Additional information is available from Personal Computing to Aid the Handicapped, Johns Hopkins University, P.O. Box 670, Laurel, Md. 20810 and from the more than 6,000 Radio Shack stores, computer centers and participating dealers nationwide.

## IEEE Plans Week of Tutorials April 6-10 in Three Sessions

ORLANDO, Fla. — A week of tutorials in three tracks will be conducted here April 6-10 by the Institute of Electrical and Electronics Engineers (IEEE) Computer Society.

Concurrently on day one of the week-long program, the following three sessions will be conducted: "VLSI from a User's Perspective," "An Overview of Networks and Distributed Processing" and "Models and Metrics for Software Management and Engineering." Day two offers the following choices: "Microcomputer System Design and Techniques," "Computer Communications Protocols" and "Modern Programming Language Design." Day three sessions include "Microprocessor Interfacing Techniques," "Computer Networks" and "System Analysis and Requirements Specifications." Day four sessions cover "Interactive Computer Graphics," "A Pragmatic View of Distributed Processing Systems" and "Software Testing and Validation." Finally, on day five, the three tracks include "Computer-Assisted Design and Engineering," "Local Computer Networks" and "Software System Design."

No registration will be allowed at the door. Fees for members are $85 per tutorial, $400 for the whole week; and $100 per tutorial for nonmembers, $475 for the week. The IEEE may be reached through P.O. Box 639, Silver Spring, Md. 20901.

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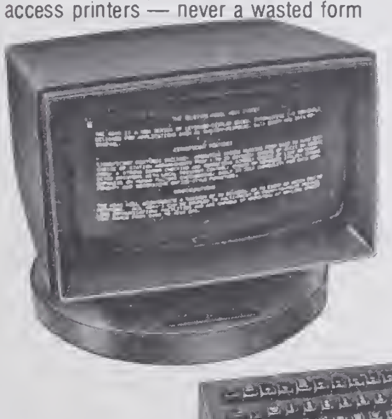

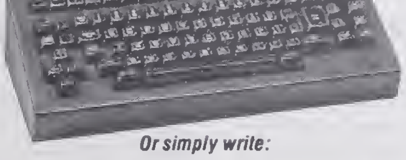

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# EDITORIAL

## Not the Only Route

DP users may find it far more difficult to recruit qualified entry-level programmers and systems analysts in coming years because too many computer scientists have no interest in training people to take such jobs.

Computer scientists are leaving academia for industry in droves because industry pays much better or because it offers more attractive environments for research.

Those recent findings by the Computer Science Board, which represents the 67 academic departments that grant computer science doctorates in the U.S. and Canada, echo a study performed by an Association for Computing Machinery (ACM) committee about two years ago [CW, Sept. 17, 1979].

Both groups found graduate students dropping out of computer science Ph.D. programs to earn more in industry than their former teachers were earning. The number of computer science doctorates conferred annually — the base for new computer science faculty — has decreased since 1975 while the number of computer science undergraduates has doubled.

The Computer Science Board estimated that more than 600 faculty positions were available to last year's 200 American Ph.D. graduates in computer science. Industry now offers annual salaries as high as $45,000 to assistant professors in the discipline who average well below $30,000, the board noted.

For most other academic disciplines, the number of new Ph.D.s has long been many times the number of available assistant professorships. Although thousands of new humanities doctors commonly fight for a single untenured professorship each year, fewer than 100 of last year's new computer science doctors took academic jobs, the board stated.

Most of the 200 new computer science doctors entered industry, which offered them nearly 700 jobs. These people would have had heavy teaching loads in academia, but industry offered opportunities to continue research without teaching.

Where does this leave DP users who need trained programmers and systems analysts?

First of all, who says Ph.D. computer scientists are needed to train DP professionals? DP is not computer science, although many people have prepared for the former by studying the latter. That's because few universities have offered genuine DP programs. Dozens do now, but computer science programs — as modest as they may be because of the tight budgets imposed on them — still outnumber DP programs about five to one [CW, Nov. 5, 1979].

There are alternative approaches to learning the trade. One, which used to be the norm for many socially prestigious trades, is apprenticeship — still a good way to enter journalism, acting, schoolteaching, politics (in a sense), buiness administration and, yes, programming.

Universities will be hobbled for years by budgetary restraints, which largely reflect a sour economy and the demographics of a declining birth rate (although this appears to be slowly reversing). But universities are not the only way to prepare well for a challenging profession. For DP, they may be quite unnecessary.

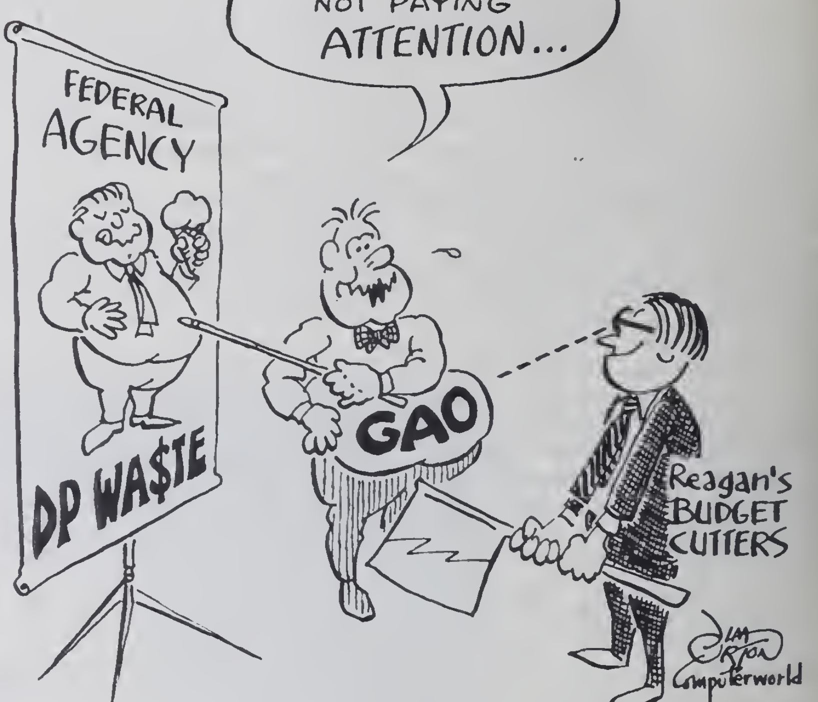
# DATA PAST

### Five Years Ago
### March 15, 1976

MORRISTOWN, N.J. — AT&T planned to introduce a transaction network service that would provide banking-related capabilities, according to Edward Goldstein, AT&T's director of product management. The network, to provide electronic funds transfer types of services, would be a switched service providing users with access to various data bases.

### Ten Years Ago
### March 17, 1971

LOS ANGELES — Strong opposition by computer users to a proposal to meter local data calls forced postponement of the issue before the California Public Utilities Commission. More than 20 user complaints were sent to the commission in response to a commission report blaming computer access lines for overloaded telephone conditions.



# LETTERS

### Standard for Basic

Recent articles such as "Not So Basic Anymore" [CW, March 2] attest to the fact that Basic is an important computer language.

The good news is that more and more people are learning computing through using Basic (and other languages). The bad news is that the many versions of Basic differ drastically among themselves. More important, most still differ in crucial ways from the published standard for Minimal Basic (Ansi X3.60-1978 in the U.S., Ecma-55 in Europe and in the final stages of becoming an International Standards Organization standard).

X3J2, the American National Standards Institute (Ansi) committee that developed the standard for Minimal Basic, is currently developing a more complete standard for Basic. The technical work on this proposed standard is in its final stages and is being carried out in cooperation with the European Computer Manufacturers Association (Ecma) TC21 committee and a group associated with Purdue Real Time.

When the new standard is made available for public comment (which should happen within a year), it might be a good idea for a software analyst to comment on its features, especially in comparison with current versions of Basic on both micro and large machines. I believe I speak for the X3J2 committee when I say that such comments will be most welcome.

Thomas E. Kurtz
Chairman, X3J2
Dartmouth College
Hanover, N.H.

### Concern Appreciated

I would like to express my appreciation for the editorial "Not for Men Only" [CW, March 2]. *Computerworld* is entirely correct in its estimation of the reaction of women and, in fact, many men to off-color comments made by male speakers at computer conferences.

The continued concern expressed by CW about the role of women in the industry is deeply appreciated.

Sally A. Sloan
Minneapolis, Minn.

### Right on the Line

"Not for Men Only" put it right on the line. I hope someone sent a copy to the speaker in question.

Thanks for your support! We women in DP can use all the help we can get in combating this problem

Linda Pursell
Louisville, Ky.

### More Negative Reactions

"Unlike Execs, Technicians Pleased by Cobol Changes" [CW, Feb. 9] was poorly researched and quite misleading. I have a wide variety of contacts with technical specialists both in Atlantic Richfield and in other companies through participation in the Guide industry organization.

Discussion of the X3J4 proposed Cobol standard with these people has consistently produced more negative than positive reactions. *Nobody* I've spoken with has been "pleased" with the proposed standard. In general, the more they knew about the standard, the less they liked it. I suggest that such slanted coverage of technical issues does a disservice to the industry.

L. Edward Walker
Los Angeles, Calif.

*Computerworld* welcomes comments from its readers. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Box 880, Framingham, Mass. 01701.

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HUMAN CONNECTION Jack Stone

# Performance Standards Demand Objectivity

The U.S. Army's Electronics Research and Development Command (Eradcom) has drawn up a set of employee performance standards that might help readers with their own performance appraisal programs. Here are some more points in the Eradcom approach, which was introduced in last week's column.

To begin with, Eradcom sets forth the dimensions of performance measurement, based on the goals of accuracy, observability and documentability:

*Quality of work.* This dimension describes how good or how thorough the result must be. It refers to accuracy, appearance, usefulness or effectiveness. It may be expressed as an error rate (errors allowable per unit of work) or as general results to be achieved (if numerical rates are infeasible).

*Quantity of work.* This specifies how many work units must be completed within a specific time period.

*Time requirements.* This answers such questions as when, how soon and within what period. Where quantity standards cannot be established, it may be possible to set time limits. Also, when work tends to fluctuate or there are seasonal trends in work load, a time-per-unit requirement may be a practical means of measurement.

*Cost-effectiveness.* This dimension may be used when performance can be assessed in terms of the amount of money saved, earned or expended while the work is being performed.

*Results desired.* This one may be used when the standard is to be expressed in terms of the ultimate effect to be obtained or when the results are not easily quantifiable.

*Manner of performance.* This dimension is helpful in establishing standards of performance for positions in which personal contacts are important factors, or when employee attitudes, mannerisms and behaviors have a significant effect on performance.

*Method of doing.* This is used when there is a prescribed procedure or method for accomplishing a task and when the use of other than those prescribed is unacceptable.

## Three Bases

The report suggests that there are three different bases of measurement:

*Historical standards.* These are based upon results achieved in the past and are frequently set as a percentage higher or lower than results achieved during an earlier period.

*Comparative standards.* These are based upon the performance or goals of other employees or organizations.

*Engineered standards.* These are absolute requirements, without comparison.

The report then states that standards may be expressed in various terms:

*Positive standards.* These state exactly what is wanted, or they may establish a requirement for an increase in a product or service.

*Negative standards.* These spell out what is not wanted, or they may set forth the need for a decrease in a product or service.

*Zero or absolute standards.* These tell when no action or service is to occur. They should be used only when there

*(Continued on Page 42)*

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SOFTLINE/Werner L. Frank

# Much More Than Fun and Games

The youngest generation is growing up surrounded by computer technology. Games are chip-driven. Video tubes tied to computers are available to even primary-level students. Children are using hand-held calculators and related devices, such as spelling and translation units.

This new breed will emerge well aware of, and knowledgeable about, what can be expected from computers. They will possess the appropriate vocabulary and understanding of DP concepts as well as appreciate the computer's capabilities.

In short, they will drive the market, rather than be led.

## Understanding Eased

The developing chip-oriented consumer environment is providing an enriched vocabulary, as well as understanding, of computer functions and operations.

Take, for example, the term "default value." I have found this to be one of the harder concepts for the noncomputer person to grasp and understand.

Defaults are, of course, standard or built-in values for given parameters of a computerized system. These values are usually invoked during execution of the application, unless overridden and modified by the user prior to initiation of the processing. Thus, default values are the preset values assigned to parameters in order to protect the user and the system from operating with deficient or insufficient data.

One other purpose is also fulfilled: input demand on the user is minimized. This is accomplished through avoiding keystrokes and possible mistakes in entering data, at least for the parametric settings which may remain invariant most of the time anyway.

Any youngster familiar with one of the widely available electronic games will readily understand the idea of the default upon noting the options he has in playing the game. He can operate the game in its natural or default mode or override certain preset conditions and modify the play.

From switch "on," today's youths are exposed to computer operating fundamentals and notions. There is the display unit which may be the ubiquitous video screen or simply a one-dimensional register. There are likely to be a keyboard and switch settings. Imagine the impact on the child who notes the various options or alternatives available by switch selection. Certainly the "function key" concept will readily emerge.

But switches and keys are not the limit for input. The toy may also have analog devices for controlling the play action or may even be able to detect and respond to the pressure or contact of a finger. The notion of recognizing location or position through a cursor will develop easily.

## Restart, Recovery

Every game player gets into a jam once in awhile and is led into a blind corner or bewildering situation. But all is not lost, and one is trained to return

*(Continued on Page 42)*

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SOCIOLOGY OF COMPUTING/ Robert L. Glass

# The Computer Hijack

Marketronics (a company I invented) dominates the computing market. Now that's *not* a statement of antitrust violation, or of misbegotten corporate ethics, or any other controversial judgment. Just a statement of generally accepted fact.

There are those who believe, however, that Marketronics' domination *results from* antitrust violations or misbegotten corporate ethics. And that, too, is a statement of generally accepted fact.

This story is about Telly Ballinger. Telly is one of those who doesn't believe in, or trust, Marketronics. That is a crucial element of our story.

Telly is also both a highly principled and a highly capable computing technologist. And that, too, is a crucial element of our story.

With just one other crucial element I can start my storytelling: Data security, although widely believed in, has been and continues to be nearly nonexistent using today's most commonly accepted technology.

Now, let's stir those crucial elements in the crucible of an actual computing world scenario. The result will be a chain of circumstances reaching administratively to the top of the state and journalistically to the national press.

The specifics will be fictionalized in order to protect both the innocent and the guilty. Bear in mind, though, that the underlying story is true, and the events were pretty much as I am about to depict them.

The fictionalized state is Kansas. The fictionalized institution where the fictionalized Telly Ballinger is employed is Kansas A&I. Telly is a systems programmer in the computer center at A&I and is also working on his Ph.D. in computer science. Telly, in short, is a savvy guy.

This is not the case for the erstwhile data processor manager for the state of Kansas. Budge Camber, as we will call him, is one of those all-too-common computing managers whose technical competence is stuck at the quill-pen-and-abacus level. He became a manager 30 years before he became a computing manager, and his technology-independent decisions are like a plague upon the sunflower-clad Kansas land.

## Herd Principle

As is commonly true among those lacking in competence, Budge followed the Herd Principle in computer selection and procurement. Whatever the Herd is buying, according to this principle, thou shalt also buy. No one can fault you if your selection goes wrong.

The Herd, during the era of our story, was buying Marketronics. In fact, the Herd has always bought Marketronics and, antitrust notwithstanding, it looks like it always will. Be that as it may, Budge Camber stocked Kansas' computing installations with Marketronics 3PIs like they were going out of style. Which they, of course, were not.

This mass installation of Marketronics hardware worked a hardship on Kansas A&I, however. An innovative campus computer center manager there had, a few years before and with legislative approval, installed a Quadranova computer to satisfy the academic requirements. The Quadranova was blazing fast, even laying rubber during sysgen, and had a timesharing system that no one had ever succeeded in degrading response time, even when they tried. A&I folk were pleased with their Quadranova and had no wish to let it go.

One thing about Budge Camber. He not only followed the Herd Principle. He also believed in it. Slavishly. If one Marketronics 3PI was goodness, he reasoned, 10 or 40 must be next to Godliness. Non-Marketronics computers, then, became a blot on his Godly landscape. With this reasoning, he set out to pluck out the offending Quadranova at A&I.

## Unanimous Reaction

The reaction of A&I, when the Word came down from Budge, was incredulity. The Quadranova had not been whimsically procured. They had facts and figures showing that the Quadranova not only danced cost-effective circles around the 3PI, but that it could thumb its nose at it and chew gum at the same time.

The 3PI stuck in the craws of a lot of A&I folk, including Telly Ballinger. But while the other A&Iers performed handwringing exercises and joined in administrative hate groups, Telly decided to act. He formulated a plan, one requiring ingeniously intimate technical knowledge, and one that had to be executed alone.

As Budge clamped down more and more controls on the Kansas DP system, the pressure increased on A&I to

*(Continued on Page 44)*

# Much More Than Fun and Games

*(Continued from Page 41)*

to the initial or neutral state by pushing the reset button. Can one more dramatically teach the restart and recovery function?

And then, of course, wrong moves may be selected or bad data entered. The beep has become an internationally recognized signal alerting the user/player that something has gone amiss, or at least that the device wishes to communicate some message to its operator. Indeed, voice synthesizers have found early common use in these low-cost devices, long before such use is being contemplated for the larger computer systems.

Two-player games usually can be modified by having one player compete with the game board itself. This is an illustration of a human playing with or against a computer. The human player will begin to understand the nature of preestablished (programmed) scenarios as well as dynamic responses to randomly entered prompts. What a way to teach and appreciate aspects of artificial intelligence!

### Random-Number Concept

The varying and unpredictable behavior of game performance as a function of player prompts must arouse the curiosity of the young. The observation of these seemingly surprising responses will surely lead to an early understanding and appreciation of the random-number concept as well as its utilization. Sophisticated mathematical theories of probability will become second-hand tools for this new generation and lead to future understanding of statistical analysis and business applications, such as economic planning and forecasting.

Computer-related lingo can, of course, be more technically oriented. But nothing seems too difficult for the consumer marketplace, as witnessed by the following caption on an attractive box: "It's a calculator, has six digits, four functions and floating decimal . . . for four years old and up . . ."

Another reads "two-digit operation, three-digit number."

And then there's the anthropomorphic approach: "I'm programmed to beat you."

Just imagine the difficulty in teaching these concepts in the classroom!

While PEEK and POKE may not yet have entered the lexicon of the younger set, other computer terms have certainly been introduced. Memory, console keys, readout, field display, overlays, clear and enter buttons and error messages have become familiar.

The concept of system capacity is also understood. Young people realize that games can come with additional options relating to number of plays, number of players and skill levels.

Finally, games can be modified by changing skill levels or operating modes and altering the logic process. While some of these changes are effected by switch setting, others may be a result of replacing plug-in modules. Whichever is applicable, the idea of being able to change the environment through a program change becomes apparent.

The electronic toys of today are providing the springboard for a new generation that will view the computer as a common and friendly device. These instruments are serving to expand and heighten the level of computer literacy in our society.

*Frank is executive vice-president of Informatics, Inc., Woodland Hills, Calif.*

# Standards Need Objective Gauge

*(Continued from Page 41)*

is no possible alternative, because they mandate nothing less than perfection and therefore deprive the employee of the opportunity to exceed expectations.

Here are some caveats for the process of formulating standards:

1. Sometimes it is advantageous to use a range of performance, particularly where fluctuations in work load cannot be strictly controlled or where factors beyond the control of the employee may influence productivity.
2. Standards must be accompanied with performance measurements that are objective. Words such as "rarely," "accurately" and "reasonable" leave too much to personal interpretation.
3. Watch out for the use of percentages. For example, an accuracy rate of 90% to 95% may sound high, but the nature of the work and the volume being measured might make the percentage unrealistically low.
4. Standards should be prepared for each position, not for a class of positions, except where the duties and working conditions are identical.
5. The employee must be involved in the development of the standards.
6. Setting standards is a continuing process. It is far better to accept a less-than-perfect set of standards — as long as both supervisor and employee understand this — than to keep plugging away until both parties are bored with the project.
7. Standards should be rewritten whenever significant changes are made to the organization's plans and goals.

The report concludes with this: "Realistic, measurable, communicated and understood job performance standards will not only result in benefits to the supervisors and employees, but will enhance overall productivity of the organization."

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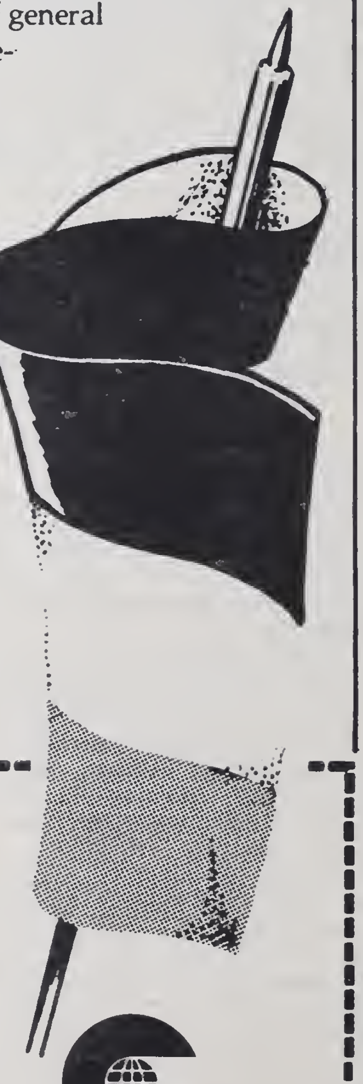

# LETTERS

## Limited Exposure to DP

The comments of Josephine Johnson ["Don't Be a Tinkerer," CW, Feb. 9] are typical of the non-DP manager who has only a peripheral knowledge of the industry. Her statement that most DP systems are developed by tinkerers with no business knowledge indicates an extremely limited exposure to DP professionals, and I am not sure she would recognize some of the best in the country.

By her own admission, she is not an experienced DP professional. (She never wrote a Cobol program except in school and has written "only a little Fortran.") With so little personal experience in the technical aspects of DP, it is no wonder that she considers DP a "good foundation for manager."

Most DP professionals are people who really have two or more professions. These men and women not only possess extensive technical knowledge in DP, but also possess considerable knowledge in a wide variety of businesses and professions.

There is plenty of room for DP professionals to move into management *within* DP. There is a great need for good DP managers who not only are familiar with the business of their employers, but who are also abreast of the technical developments within the field. A good DP manager must not only know what is to be done, but how it is to be done using the best techniques afforded by the equipment and the state of the art.

Without a thorough understanding of the technical aspects, it is impossible to manage technical people or projects truly effectively.

I have spent more than 21 years in DP, working my way up from a programmer trainee to management with a software development house. Yes, I am a technical manager who possesses extensive knowledge in a wide range of business applications.

In all my years in DP, I have never regarded DP as a "foundation" for becoming a manager, but rather the type of business I intended to manage.

As for Johnson's "isolation" as a female executive, I can only state that I have never, at any level, felt "isolated" from my male counterparts. While I have, at times, been forced to deal with the typical male chauvinist, my experience on the whole has been a rewarding one in which I have found acceptance and respect from the men both below me and above me in the corporate structure.

I really believe that women executives and women trying to achieve success in male-dominated fields must do away with any tendencies toward paranoia, and if they want to "break out of isolation" perhaps they should begin with some evaluation of their approaches and behavior toward others.

There is as much reverse chauvinism around as anything, and it must stop if women want to continue forward strides in business.

Florence Michael
Denver, Colo.

## Millions at Stake

Larry Long's reply to the question of illegally copying and distributing software [CW, Feb. 2] was correct as far as it went, but the tone more closely correlated with a five-year-old stealing a cookie than a company violating a contract that could cost the licensor many millions of dollars or cause bankruptcy.

Saturn Systems, Inc. makes and licenses word processing software for the Digital Equipment Corp. PDP-11. Part of the terms and conditions is: "User will take all necessary and reasonable steps to keep the software under adequate security to ensure that no unauthorized copies or uses are made thereof."

Because we make our products available on RT-11, TSX, TSX Plus, RSX-11M, RSX-M Plus, IAS, RSTS and VMS, we would have a hefty software bill staying current with all of these systems. We could tell ourselves that we are helping to sell these products by enhancing their value with word processing, and we could say that we only use them for testing purposes. But we don't. We expect our customers to live up to their contracts so we do the same.

We either buy licenses for our in-house hardware or get time on other legitimately licensed computers, or we sell at a discount with free computer time thrown in for debugging. Some work is done out of town. It is expensive, but it is the only way to operate honestly.

There are other software firms like us. We are talking to them about forming an organization to help police each other's products. We need all the eyes and ears we can find, but we also need *Computerworld* not only to point out what is right, but to emphasize it.

Allan N. Sheppard
President
Saturn Systems, Inc.
Minneapolis, Minn.

## Why Front-Page Coverage?

I responded with anger to "Kickbacks, Gifts, Sex for Jobs" [CW, Jan. 12]. Surely the editorial staff must know that the crooks and scum in every business (including journalism and data processing) represent a very small fraction of that industry. How do they justify such front-page news coverage? Why such dramatic play?

When was the last time *Computerworld* wrote an article on the positive qualities of our industry?

Lee Foote
Vice-President
Foote-Waldron
Bellevue, Wash.

The price is right...,

Emerson's new solid-state 415 Hz UPS

Now, for the first time, price tags favor solid-state when you're in the market for 415 Hz power. Emerson's new 60 KVA solid-state uninterruptible power system (UPS) is priced lower than motor generator sets and is the only solid-state 415 Hz UPS in the 60 KVA range.

Before this price shift, motor generators were chosen on investment cost alone without consideration of long-range operating costs. However, they proved more costly to operate than solid-state systems due to the inherent maintenance problems, low efficiency and problems associated with these rotary, mechanical systems.

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# System Security Breach Lets Hijacker

(Continued from Page 41)

unload the Quadranova. In fact, Budge drew up a plan specifically detailing how to offload the Quadranova and make room for a 3PI. It involved using time on the Kansas Department of Motor Vehicles 3PI as an interim measure until the phaseover could be completed and a 3PI installed on-site at A&I.

The lights in Telly's on-campus apartment, meanwhile, burned well into the night for many nights. Telly wanted to do more than show up the 3PI with facts and figures — that had been done before. He also wanted to show it up in some dramatic way.

### Hole in the Dike

As Telly poked and probed at the 3PI documentation, looking for a soft spot in the system, he feverishly jotted down notes. But one night, in the midst of just such a study session, he found, at long last, the hole in the 3PI dike for which he had been looking.

Telly's late-night readings had left him intimately aware of the internal workings of Big Oz, the operating system on the 3PI. And his plan, unspecific at first, now evolved to depend on his newfound Wizardry over Oz.

The data security of the Department of Motor Vehicles 3PI was easy to compromise. Telly knew that all the ways and means of breaking the system were scattered among the trivia of the Oz documentation. If he could access the DMV data files, extract some data and then tell the world about it, he would have shown up a serious inadequacy in the 3PI computer from a public-sector point of view.

Furthermore, if he could show that any sharp A&I student could do what he had done, then he would have proven that the use of DMV's 3PI in the time-sharing world of A&I was dangerous in the extreme . . . any Josephine College with an appropriate IQ could make off with highly sensitive data unbeknownst to the fileholders.

It remained only to carry out the plan. Telly checked out a portable terminal from the computer center one evening, saying he had some work to do at his apartment. Once there, he plugged his home phone into the coupler and dialed up the DMV computer. He logged on, with an already established charge number and password. And then, like a master locksmith, he used his documentation-gained knowledge to browse the incore contents of Big Oz until he found what he was looking for — the master password index.

### In Total Control

Not many connect-time seconds had passed. Telly's planning effort had been as thorough as an Alfred Hitchcock bank robber's. Grabbing the master index contents, he jotted them on a piece of paper with all the joy of a locksmith hearing the tumblers click into place. He now had total control of the data security system.

With his newfound knowledge, Telly now began browsing the heretofore secure DMV files themselves. He was looking for something, not sure what it would be, that could grab public attention if released to the press.

And then he found it. Budge Camber, said the file, had been

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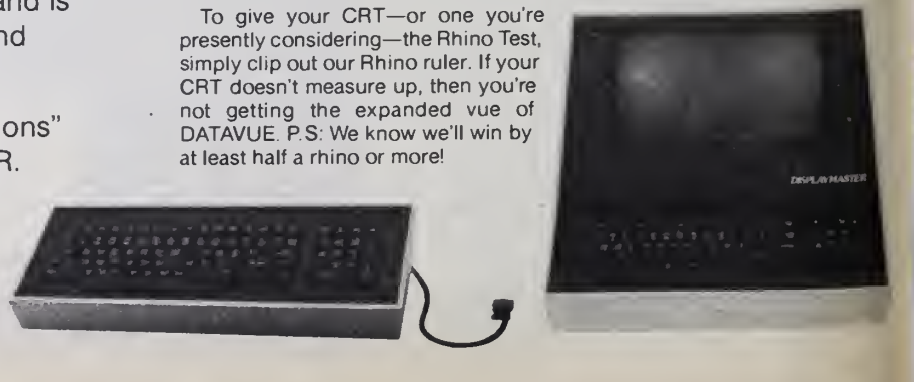


# Score Victory Over 'Herd Principle'

arrested for drunk driving a couple of years before. There had been an accident. Several people had been hurt. It was frighteningly potent data, just what he had wanted.

Shifting his search from the DMV files, Telly now concentrated on the operator communication file. As he suspected, Big Oz was totally unaware of his intrusion and hadn't passed any relevant messages to the operator. Telly prepared to change that situation.

Locating the divide check interrupt servicing routine, Telly inserted changes into the code to transfer out to a patch of his making. Into the patch, he constructed the culmination of his whole plan. Via the patch, he would take control of the computer from Big Oz, tell the operator what he had done, play a few other trump cards and put the DMV 3PI into a hard wait loop.

The final step began. Telly keyed in a program with a deliberate divide check in it and launched it into the batch stream. Within minutes, the divide check had occurred, the interrupt servicer had taken control, his patch had been transferred to and the operator's display, screen began flashing a series of messages.

"This computer has been hijacked," began the message, "to show its lack of security. Please notify Budge Camber and the United Press. Do not attempt to restart — it has gone into an infinite wait loop. To illustrate data security inadequacy, the following data is taken from the nonpublic DMV files." And there followed an account of Budge Camber's brush with the law.

"Repeat — call Budge Camber, call UPI. Repeat — call Budge Camber, call UPI." It flashed, over and over, until the astonished operator in that remote and secure computer room did as he was bid and woke Budge Camber in the middle of the night and called the press.

Telly wasn't sure what would happen next. He didn't really much care if Budge Camber was called — that was largely bravado — but he did want the press involved. That was a vital outlet for his technological confrontation. Just to be sure, he picked up the phone and dialed UPI himself. "I have reason to believe," he said, "that the Department of Motor Vehicles computer was hijacked tonight. This is Telly Ballinger . . ."

Budge Camber was puzzled to be wakened from a sound sleep. By the time the phone call was over, he was livid. Someone out there was trampling all over his territory, and he didn't even know who it was.

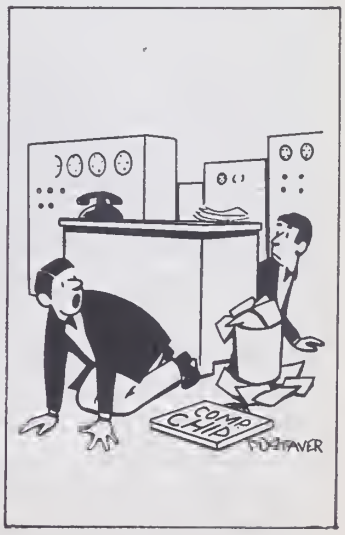
Even before the dawn, bundles of the *Kansas City News-Tribune* were deposited all over the state. Kansas residents were greeted by both the dawn and a Page 2 headline reading "DMV Computer Hijacked." Below it was another, smaller: "A&I Student Proves a Point."

What made Page 2 in Kansas City made Page 5 in New York City and, later in the month, Page 1 in *Computer Trends*. And people began choosing up sides all over the country.

A few weeks passed by, the public outcry died down and Telly was fired for the security violation. The local ACM chapter protested to the governor, but nothing came of it.

Did Ballinger lose the war? Maybe not. For one thing, the number of companies bidding for his services when Budge dumped him was an adrenalin pumper all its own.

Perhaps more to the point, A&I still has its Quadranova, and the link to the 3PI is long gone. And Quadranova salesmen all over the country still talk about the day the Marketronics 3PI was hijacked.



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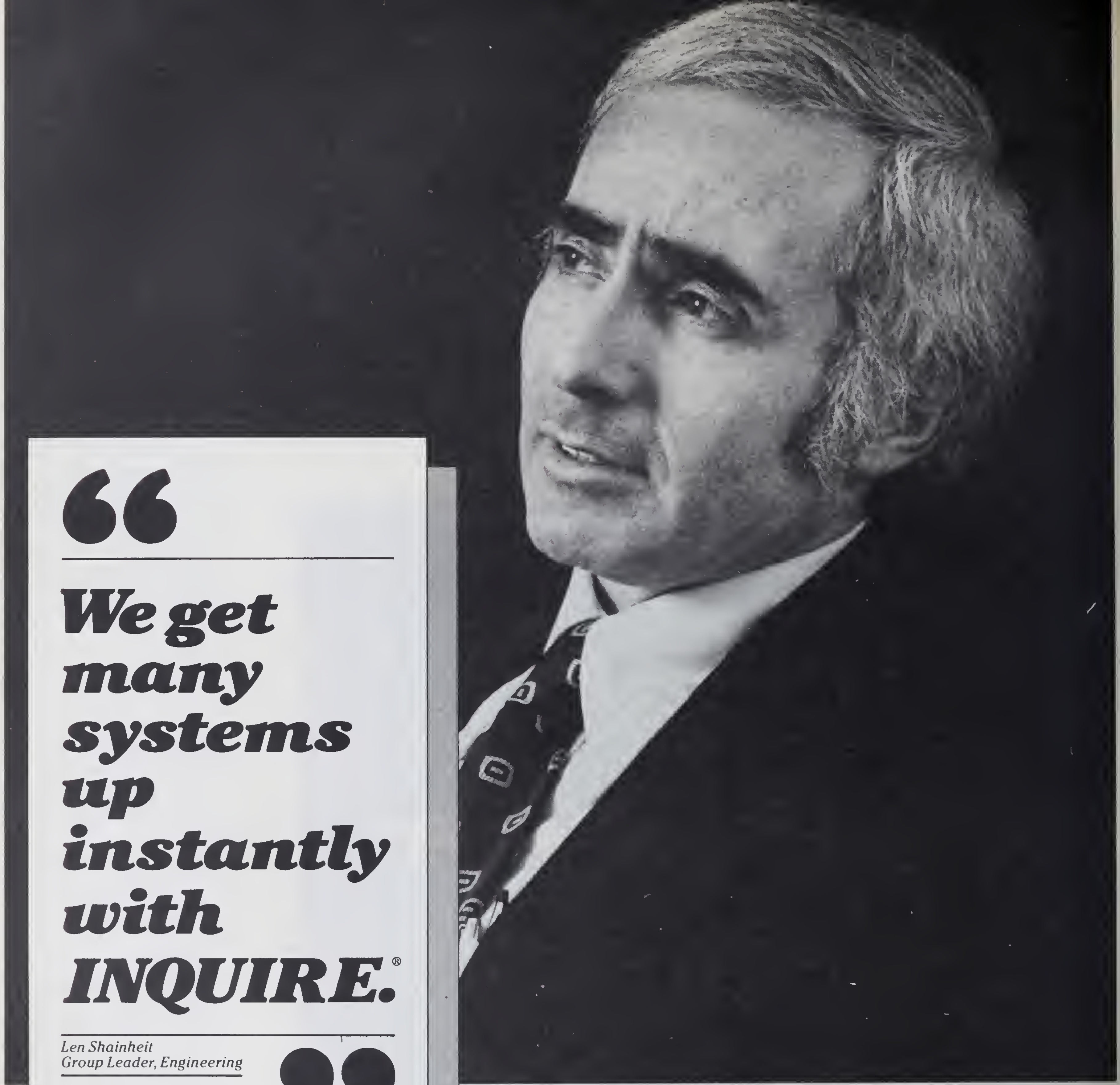

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## *Speeds Short-Term Borrowing*

# DBMS Enhances Olin Corp.'s Cash Flow

STAMFORD, Conn. — Olin Corp. here has cut monitoring time for short-term borrowing from four hours to almost nothing with the help of a data base management system (DBMS).

The firm's cash management department implemented the terminal-based system using Infodata Systems, Inc.'s Inquire DBMS in order to keep tabs on Olin's cash flow situation, an Olin spokesman explained.

It used to take three or four hours to manually compile information into a daily report that provided only "very basic" detail item statistics for staff members, he said. Calculations on overall performance were extremely time-consuming to generate and often completely prohibited by constraints. And since the report could only be produced on a daily basis, the treasurer had to make important decisions in a widely fluctuating situation from information which was always at least several hours old.

Inquire not only provides the same basic information in an on-line mode for immediate update, it also generates monthly and year-to-date dollar and rate statistics never before easily available, Olin said. Calculations performed during on-line maintenance can be used to verify lender institutions dollar amounts and rates, and a daily report now goes to the highest levels of management within the company.

Olin's cash management department is not the only area currently using the interactive data base system, the representative noted. The firm's Inquire applications include a plant property system to handle capital assets accounting and a sales and marketing system to plan sales strategy and analyze competitor information.

Government reporting requirements are also satisfied via the DBMS. Even Olin's corporate telephone directory, which includes more than 8,000 numbers across the country, is an Inquire data base which allows on-line queries, he noted.

### End-User Needs

An IBM 370/158 running under MVS/SE serves both Olin corporate and chemicals headquarters in Stamford. Although the staff includes approximately 100 data center technicians, it was the firm's end-user needs that were of primary concern when Inquire

*(Continued on Page 48)*

# *'Demand/91' Allows Maps*

BAY CITY, Mich. — Demand/91, a software system that enables users to nonprocedurally map their way through video files, has been developed by Olamic Systems Corp.

Demand/91 reportedly eliminates the file-handling logic required by conventional high-level data base languages to manipulate data in two or more loosely related data base structures or files. It can be used for most video applications that require creating, changing or retrieving information in files.

The "natural memory navigation" capability allows viewers to cross-reference files and project information on a local video device. Demand/91 then automatically assembles the information necessary to satisfy the information request.

The system nonprocedurally projects relationally joined data images derived by navigation through several logical levels within multifile data base structures. Different video forms for the projection of information can be created or modified to suit the level of use.

Demand/91 currently runs on Digital Equipment Corp.'s Decsystem 10 and 20 interactive information transmitters and interfaces with System 1022, a data base management system.

A permanent license for Demand/91 will cost $9,500 for commercial installations and $6,500 for academic institutions, the vendor said from 503 N. Euclid, Bay City, Mich. 48706.

# ADR Updates 'Datadictionary' To Integrate 'The Librarian'

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has updated its Datadictionary facility to include a greater range of on-line programming capabilities and integration with The Librarian, its file maintenance system.

Because of ADR's Virtual Telecommunications Processor (VTP), Release 2.2 of Datadictionary On-Line (DDOL) can be installed with Datacom/DC, Roscoe or CICS/VS without requiring additional interfacing software from ADR. DDOL operates under IBM's OS/VSI, SVS, MVS, DOS/VS34 and DOS/VSE.

According to ADR, the integration with Version 3.0 of The Librarian (LIB/DD) allows Datadictionary to serve as the central repository for Cobol, PL/I and assembler data definitions that can be referenced directly by a program stored on The Librarian.

Programmers can copy data definition into any member in any Librarian library by using the Copydd statement in the file maintenance system, the company said.

Prior to writing the compilation file, LIB/DD makes a request to Datadictionary for each Copydd statement in the source member. After processing the requests, Datadictionary passes the relevant statements to the compilation file.

The permanent license price for the new release is $19,082 for DOS and $22,184 for OS. The vendor is located at Rt. 206 and Orchard Road, CN-8, Princeton, N.J. 08540.

# RSI's 'Oracle' Now Under RSTS

MENLO PARK, Calif. — Relational Software, Inc. (RSI) is offering Oracle on the RSTS operating system for Digital Equipment Corp. PDP-11 hardware. The relational data base management system was previously available only on PDP-11s and VAX-11s running under RSX-11M, IAS, Unix and VMS.

Orders are currently being accepted for delivery of the RSTS version on or after May 1. It will require RSTS/E Version 7 (or newer), but contains all the same features and facilities of Oracle under other operating systems.

A perpetual license for Oracle is available for $48,000, and lease terms are available for $2,000/mo from RSI at 3000 Sand Hill Road, Menlo Park, Calif. 94025.

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# 'UFO' Update Gives Access To IBM DL/1 Data Bases

HASBROUCK HEIGHTS, N.J. — Oxford Software Corp. has announced Version 2.4 of its UFO data base management system (DBMS). The enhancements to this version include a capability to access IBM DL/1 data bases in a way that is transparent to the user.

UFO acts as an interpreter between the user and DL/1 and allows less technical people to work with DL/1 data bases, the vendor claimed.

Also included in the enhancement is a display definition extension (DDX) that creates a "master data dictionary" system. In the past, each display definition had to be defined for each procedure or program. Now each definition is only made once and stored in the UFO dictionary.

Version 2.4 provides an Extended Executive Inquiry Facility that allows the user to apply English commands to do selects against any data set or existing displays, the vendor said.

Oxford has also added a facility to the DBMS called UFOpaint. This facility allows the user to build screen layouts with fields, lines and spaces. By using the ENTER key, UFO will recreate the screen, the vendor said.

Other features include field-level security, a DMS conversion program, an IDMS interface, color terminal support and enhanced error diagnostics, the vendor said.

UFO costs $18,000 in a DOS environment and $24,000 in an OS environment, the vendor said from 174 Blvd., Hasbrouck Heights, N.J. 07604.

# Two Programs Prepare Manuals On DG Novas and Eclipses

DUNSMUIR, Calif. — Applied Business Systems has developed two software tools for automatically preparing reference manuals on Data General Corp. Novas and Eclipses.

Screen-Def is a tool for preparing CRT terminal screen layout documentation. It allows users to enter parameters, via a CRT terminal, that describe how a screen layout should appear. Report-Def allows users to enter parameters, via a CRT terminal, that describe how a report layout should appear.

Both programs produce a detailed "Definition," which includes basic header information about the program and the screen (Screen-Def) or report (Report-Def) layout. Screen-Def and Report-Def will run on any 64K-byte Nova or Eclipse minicomputer with disk, CRT terminal and printer running under Rdos with Extended Basic.

End-user license fee is $750, and OEM/dealer license fee for multiple sublicensing is $1,000. An optional Annual Support Contract is available for $100 a year, the vendor said from 4350 Upper Soda Road, Dunsmuir, Calif. 96025.

# 'Seed' DBMS Update Provides Four Levels of Backup, Recovery

PHILADELPHIA — Release B.11 of the Seed data base management system (DBMS) features four levels of backup and recovery that reportedly provide comprehensive protection against program and system failures.

The International Data Base Systems, Inc. product treats a data structure like a Cobol program, allowing grouping and redefining of fields and records. Items do not have to be referenced explicitly, and B.11 Seed also recognizes variable length items and records, the vendor claimed.

Seed runs on Digital Equipment Corp. Decsystem-10, VAX-11 and PDP-11; IBM 370, 30 series and 4300 line, Control Data Corp. CDC 6000 and Cyber series: Hewlett-Packard Co. HP 3000; and Modcomp Systems Modcomp IV and Classic computer systems.

The system costs between $23,000 and $72,000, depending on configuration, the vendor said from 2300 Walnut St., Philadelphia, Pa. 19103.

# DBMS Enhances Cash Flow

*(Continued from Page 47)*

was purchased in 1976, the spokesman said. Three out of four selection criteria used to evaluate competitive software products focused on ease-of-use and end-user compatibility, he said.

Inquire was purchased to function as a user-oriented inquiry, retrieval and report generator which could be used both in batch and on-line processing to maintain and access multiple data bases and non-data base files. It allowed employees outside of the DP department to have on-line access to information necessary for short- and long-term business decisions, according to Olin.

For example, the chemicals group transportation department uses the DBMS to locate and determine the status of any car in its large 3,000-plus rail-car fleet within minutes — an operation that took at least 24 hours only one year ago.

The system accesses the fleet master data base containing a record of every railroad tank car used by the firm, Olin explained.

In addition to data regarding the car's location and contents, the user can determine if the tank car has been recently washed and painted and whether it has been inspected by the government. Through his password, the end-user interacts directly with the system to do his own scheduling or tracking, the spokesman said.

"The availability on demand of specific rail-car location and status information gives us the ability to identify potential problems and to initiate corrective action before a crisis occurs," according to Olin's director of Chemicals Group Marketing Operations.

# *Fortran Tool Fits PDP-11s*

LAKE HIAWATHA, N.J. — An on-line, interactive, Fortran IV Plus Debugging Tool (FDI) for Digital Equipment Corp.'s PDP-11, RSX, IAS and RT family of operating systems has been introduced by Total Data Systems, Inc.

FDT is included at task build time, requires no assembly language or systems knowledge to operate, can usually be used without reference to the task build map and functions with overlaid programs, according to the vendor.

The tool provides a reduction in Fortran program development time, improves program accuracy and reduces computer time of program development, the vendor said.

Program execution with FDT can be done one Fortran statement at a time or can proceed to predefined statement numbers. The trace command can be set on any variable type, causing a breakpoint when that variable's value changes, according to the vendor.

FDT is currently available for Fortran IV Plus under RSX-11M and IAS/RSX-11D and uses approximately 3K words of memory.

A one-time license fee for the object library is $5,000 and includes object library on magnetic tape, a guarantee, installation documentation, user documentation and one year's maintenance. The one-time license fee for the source code library is $15,000 and includes source code and command files and the object library.

The vendor is at 87 Hiawatha Blvd., Lake Hiawatha, N.J. 07034.

# WP Package Aimed At PDPs Under RSX

PLACENTIA, Calif. — A multiuser, menu-driven word processing (WP) software package for the interactive creation, editing and printing of documents is now available from Data Processing Design, Inc. (DPD).

The Word-11 package was designed for users of Digital Equipment Corp.'s PDP-11 minicomputers running under the RSX-11M and RSX-11M-Plus operating systems.

Under RSX-11M, the package will run on PDP-11/23s through 11/70s.

Other features include a dictionary of 65,000 words and an expanded indexing capability. A single CPU license fee for Word-11 on RSX-11M is $7,500, from DPD at Suite F, 181 W. Orangethorpe, Placentia, Calif. 92670.

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## *And Payroll Upgrade*

# 'Tolas' Gains Support for VAX-11s

PITTSBURGH, Pa. — Transcomm Data Systems, Inc. has released a Payroll System upgrade to its Tolas software line and announced that Tolas now runs on Digital Equipment Corp. VAX-11 machines.

Designed to compute deductions, taxes and net pay for many different types of workers, the Payroll System also produces the standard reports required by both government and management.

### Multiple Sites

It can handle the operational requirements of companies with up to 1,500 employees located at multiple sites.

The Payroll System was specifically developed to meet the challenge of frequent changes in tax laws, company policies and procedures, wage rates and other items that affect the processing of a payrun.

It allows these changes to be made and verified by the direct user in the company's payroll department.

### Other Features

Other features include an automated clearinghouse interface, a labor system interface and an automatic timecard-generation capability, according to Transcomm.

Tolas software is available for operation on any Digital Equipment Corp. PDP-11 computer operating under RSTS/E.

Tolas Accounts Payable System, Accounts Receivable System, Fixed Assets System and Financial Reporting System are now operating on the VAX, in addition to subsets of FMS, Transcomm's multikey Isam system used to implement all Tolas modules, the firm said.

Prices for each individual Tolas system range from $8,000 to $13,000 per CPU.

The Payroll System is priced from $12,000 per CPU, the vendor said.

Transcomm Data Systems is located at 1380 Old Freeport Road, Pittsburgh, Pa. 15238.

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# Z8000 Development System Runs Under Unix

CUPERTINO, Calif. — A Z8000-based multiuser development system designed to run under the Bell Laboratories Unix operating system has been introduced by Zilog, Inc.

The Z-Lab 8000 Programmer's Development System can support up to 16 users and runs under the Zeus operating system, the vendor's enhanced version of the Unix system. It can be used to develop code for all Zilog MPUs and supports up to 1.5M bytes of error-correcting memory using 24M-byte 8-in. Winchester disk drives.

The Z-Lab concept separates hardware and software development tools into specifically tailored devices that can operate alone, with each other or with devices made by other manufacturers, thus protecting the user's investment in both the hardware and software areas, a company spokesman said.

The large user base and software base of development-related applications in the Unix system offers advanced documentation tools, the vendor said.

The more than 60 utilities include programs that teach the user about Zeus, send messages to users, remind users of tasks to be completed and search files for a particular character pattern.

The Z-Lab 8000 Programmer's Development System is available in two versions. Model 20, priced at $27,000, includes CPU board, two intelligent controllers, 256K bytes of ECC memory, one 24M-byte Winchester disk drive and a cartridge tape drive. Model 30, priced at $33,950, offers 512K bytes of ECC memory and two 24M-byte Winchester drives. Both models feature miscellaneous storage compartments.

Representative prices for Zeus software are $2,000 for one user and $4,250 for four users. Zilog is based at 10340 Bubb Road, Cupertino, Calif. 95014.

## *C Compilers Fit VAX, 68000*

NEW YORK — C language compilers for the Digital Equipment Corp. VAX-11 and the Motorola 68000 are now available from Whitesmiths Ltd., a system software company specializing in mini and micro system software.

The compilers, costing $600 for the end user, are supported under Motorola's Versados operating system for the 68000 and for use under the DEC VMS operating system.

According to Whitesmiths, since the code produced by the compiler is symbolic assembly language, C programs may be freely intermixed with assembler code and other languages with the use of suitable interface protocols. The system is available from Whitesmiths Ltd., P.O. Box 1132, Ansonia Station, New York, N.Y. 10023.

## 'Wordpower II' Fits System/34

OAK BROOK, Ill. — A stand-alone software system said to bring advanced processing capabilities to the IBM System/34 CPU has been announced by Professional Computer Resources, Inc.

Wordpower II features self-documented text entry/edit keys and forms application that allows users to create, fill out, store, print and revise forms, the company said.

The system also features power typing and an automatic carriage return and several printer options, including a daisy-wheel printer, the vendor said.

Wordpower II is priced at an initial license fee of $2,500 with a $250 annual renewal and update fee from Professional Computer Resources, Inc., Midwest Plaza S., 2021 Midwest Road, Oak Brook, Ill. 60521.

## Nursing Home Tool Runs on System/34

DAYTON, Ohio — A software package for the nursing home industry that includes patient billing, accounts payable and financial statement reporting has been released by Infocare, Inc.

Developed over the past two years, the Infocare Management Information System (Imis), runs on an IBM System/34 using the RPG-II language. According to the vendor, it can also support direct data entry through IBM 5251 terminals or off-line on an IBM 3742 data station.

The package is available at between $15,000 and $29,500 from Infocare, a division of Care Centres, Inc., located at 531 Windsor Park Drive, Dayton, Ohio 45459.

## Mumps Committee To Meet March 19-20

WASHINGTON, D.C. — The Mumps Development Committee will meet March 19-20 in Room 337-339 of the Humphrey Building, 200 Independence Ave., S.W., Washington, D.C.

The committee is a voluntary standards organization which oversees the specifications of Ansi Mumps.

More information is available from George F. Timson at 1703 Gough St., San Francisco, Calif. 94109.

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### *Machine Independent*

# ACT Adds Optimizer to Fortran Compiler

NEW YORK — Advanced Computer Techniques Corp. (ACT) has developed a machine-independent optimizer as an additional feature of its full Fortran 77 compiler.

The existing product, as well as its optimization enhancements, supports full Ansi standard X3.9-1978 and is implemented in Pascal so it may be customized to run on a variety of machine architectures. The compiler generates optimized native object code, as opposed to interpretive code.

A major feature is the generic code generation routines which allows the compiler to generate object code for a new architecture. The Pascal declarative structures create a "skeleton" for each code sequence within the appropriate procedure. For the Fortran 77 compiler to generate a different set of relocatable codes, only the skeletons in the procedures must be changed.

The basic price for the Fortran 77 compiler is $155,000, which includes all documentation, source programs, distribution rights and product support. Military Standard extensions to Fortran 77 (MIL-STD 1753) and the Pascal compiler are optionally available.

The vendor is located at 437 Madison Ave., New York, N.Y. 10022.

# Informatics Monitoring System Keeps Tabs on Travel Expenses

BEDFORD, N.H. — Informatics, Inc. has announced an Employee Receivables and Travel Expense Control System that reportedly provides employers with the capability of validating employee expense reports and keeps accounts of regularly incurred travel costs.

The system records information about a travel itinerary such as air fares, rental car costs and hotel charges that will be or have been incurred. This information is then run off against the actual expense report that the employee submits that contains the sales receipts and vendor invoices. A final management analysis report is produced, which compares the information, the vendor said.

Informatics developed the system to help companies monitor travel costs. The software runs on most hardware configurations, the vendor said.

It costs $35,000 for an on-line mainframe version and $25,000 for the on-line minicomputer version or the mainframe batch version from Informatics' Application Products Division, 1 Bedford Farms, Bedford, N.H. 03102.

# Facility Updates 'Datamanager'

LEXINGTON, Mass. — MSP, Inc., creator of the Datamanager data dictionary, has announced a customized facility said to feature structured analysis.

Structured Analysis Structure, a standard part of Datamanager's User Defined Syntax (UDS) facility, reportedly contains the entity types PROCESS, EXTERNAL PROCESS, SUBPROCESS, DATASTORE, DATAFLOW, DATASTRUCTURE, GROUP, ELEMENT and ITEM.

The new facility is available at no extra charge to Datamanager users of the UDS product, which carries a price tag of $3,000 from the firm at 21 Worthen Road, Lexington, Mass. 02173.

# Simplan Users To Meet March 22-25

CHAPEL HILL, N.C. — Simplan Systems, Inc. (SSI), proprietors of the Simplan system software used for financial planning and modeling, will hold its annual Simplan Users' Group meeting in Clearwater, Fla., March 22-25.

SSI president John McElroy will give the keynote address. The meeting includes ten seminars that will cover various features of the Simplan system.

Registration is free for one person per company holding an active Simplan company contract and $100 per additional person. The fee of $175 will be charged to registrants from companies that do not have Simplan contracts with SSI. More information is available from SSI, 300 Eastowne Drive, Chapel Hill, N.C. 27514.

# *System Handles Personnel Data*

WHITE PLAINS, N.Y. — An English-based human resources system designed for on-line inquiry and processing of personnel information is available from Vista Computer, Inc.

Users can reportedly retrieve data in any format or sequence and generate a variety of reports for corporate and government use.

The system may be purchased or operated on a time-sharing basis with Vista's computers. The price, depending on the configuration and data base requirements, starts at $1,450/mo, the vendor said from 709 Westchester Ave., White Plains, N.Y. 10604.

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# CICS Gains Map Aid

BURLINGAME, Calif. — The Bridge, Inc. has announced CICS-MG, a package that reads map layout information and creates BMS macros on IBM systems using CICS.

The vendor claims the package can cut the time required to create BMS macros manually from about one day to an hour. The package also creates a printed screen layout that can be used for system documentation. The CICS-MG costs $2,500 or leases for $100/mo. The Bridge is at 1485 Lakeview Drive, Burlingame, Calif. 94010.

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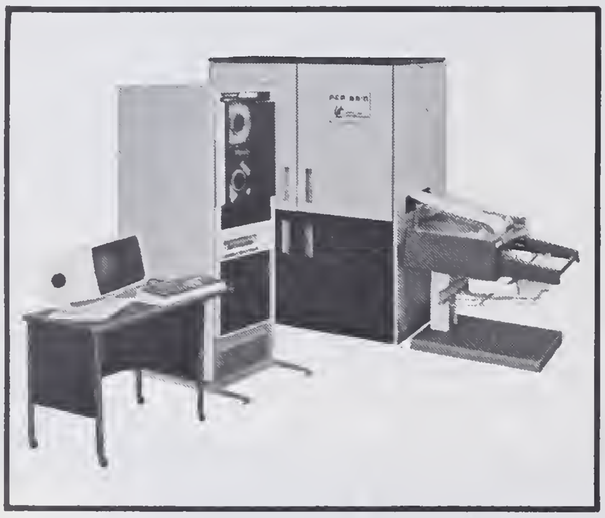

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# 'JCLcheck' Now Backs 'Roscoe'

SANTA CLARA, Calif. — Release 2.1 of Triangle Software Co.'s JCLcheck interfaces with Applied Data Research, Inc.'s Roscoe, reportedly providing Roscoe users with the same capabilities of on-line validation of JCL previously available only to TSO users.

JCLcheck is a systems utility software package that identifies run-time abends and all JCL errors.

The product runs on all OS/VS operating systems and is available for a license fee of $11,400, the vendor said from 2651 Kentworth Way, Santa Clara, Calif. 95051.

# Cobol Subroutine Claims Running Error-Correction

LOWELL, Mass. — A Cobol-callable subroutine that is said to automatically detect and correct keystroke errors on the fly in data entry applications is being introduced by Selfix Corp.

Currently implemented on IBM mainframes, Selfix06 is intended for on-line or batch validation of numeric data that is entered from turnaround documents. It is expected to be used in such areas as inventory control, mailing list maintenance and accounting.

Selfix claims the new subroutine saves money for the user because it automatically corrects all single-digit errors and all transpositions of adjacent digits, which make up the vast majority of all keystroke errors.

The subroutine is available from Selfix Corp., P.O. Box 1044, Lowell, Mass. 01853.

# Display Speeds CICS Transactions

SPRINGFIELD, Mo. — Philinda Software, Inc. has introduced a program product for IBM CICS transaction system users that was designed to provide a quick reference tool in locating a file or determining the amount of free space available on a disk volume.

Displayed information on the PSIVTOC system includes volume serial number, owner identification, creation and expiration dates and file type.

The product is available on a $95/year lease from Philinda Software, Inc., 527 W. Kerr, Springfield, Mo. 65803.

# Publishers Get Subscription Aid

UPPER SADDLE RIVER, N.J. — A subscription fulfillment system that will handle file maintenance, billing and response analysis for multiple publications has been announced by Automated Resources Group, Inc. (Argi).

The SFS/3000, written in Cobol, uses the Hewlett-Packard, Co. data base management system, Image; it was designed as an interactive on-line system that makes complete subscriber information available for immediate inquiry, update and analysis.

According to Argi, the software, which has a basic package licensing fee of $50,000, uses flexible parameter-driven techniques.

The system is available from Argi, 120 Pleasant Ave., Upper Saddle River, N.J. 07458.

# Report Aid Runs in DOS

SANTA CLARA, Calif. — Software Assistance, Inc. has announced PROCXREF, a report utility it said has the ability to list, summarize and cross-reference job control statements from IBM DOS and DCS/VS installations.

The program is directed by control cards and/or Upsi settings.

Distributed on magnetic tape, the system costs $1,000 and is available from the firm through P.O. Box 2101, Santa Clara, Calif. 95051.

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## Offering up to 30M Bit/Sec

# Users Describe Their Local-Net Schemes

By Molly Upton
Special to CW

SAN FRANCISCO — Users are implementing a variety of local-networking schemes to share DP resources. Network speeds range from 240K bit/sec with the Nestar Systems, Inc. facility used by Bank of America here to 30M bit/sec with a Hitachi, Ltd. facility used by Nippon Steel Corp.

The networking schemes were discussed recently at the Institute of Electrical and Electronics Engineers' annual Spring Computer Conference (Compcon), along with local-net facilities some vendors have considered marketing, including "Anarchy," which Hewlett-Packard Co. developed for a time and then tabled.

Ernest Brook of the Corporate Payment Services unit of Bank of America described the bank's pilot system that uses Apple IIs from Apple Computer, Inc. and Nestar's network for remittance banking tasks.

Because of various unforeseen environmental factors such as static electricity buildup in the carpets, the bank now writes the data collected at the field stations to the central disk every 10 or 15 minutes rather than at the originally planned two-hour intervals, he said.

Nestar's Edward Stritter said the network was designed to handle up to 64 Apple IIs in a local area with a total cable length of 1,000 ft. Devices called gateways may be used to link one local net with another.

The Nestar system was designed for use with personal computers, so price/performance tradeoffs were made, he said. For instance, the local-net connection costs about 15% of the price of the workstation, but can provide "somewhat more bandwidth than the stations need."

Nestar uses a carrier sense multiple-access scheme similar to that of Xerox Corp.'s Ethernet, but offers immediate acknowledgment when a message has been received, he observed.

### Hitachi's Version

Nippon Steel uses Hitachi's Data Freeway System (DFW), to solve the traditional problem of optical-fiber loops by using an optical paired bypass switch with only one connecting point. This scheme helps reduce insertion loss, the speakers said.

DFW is a 10M bit/sec single loop sufficiently reliable for industrial use; it offers a throughput of 900K byte/sec and a maximum distance between operating stations of 2 kilometers, they observed. Because a loop is subject to failure if a station malfunctions, the DFW can institute bypass when an optical switch detaches a faulty station from the loop.

The DFW can handle 255 stations on a loop and uses the to-

(Continued on Page 56)

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## Parallelism — Part 2

# Setup of Low-Cost Controllers Makes Productive DDP Strategy

By Michael G. Ritchay
Special to CW

*Concluding his two-part series on "parallelism," an approach to implementing a distributed processing network, the author describes four benefits parallelism can deliver to the user.*

A hierarchy of low-cost functional controllers that individually accommodate one or more data entry terminal packages makes possible a strategy for implementing a distributed data processing (DDP) network that is called "parallelism."

As explained last week, the user of parallelism could install one of five different controllers, operating with any of four different data entry packages, immediately converting existing IBM 3270-type data entry clusters into highly productive DDP systems.

For a modest sum, the user can obtain four immediate, measurable and often massive benefits from parallelism.

First is a potentially very large reduction in the amount of host processor time involved in editing records and data sent from remote locations. Many users estimate that as much as 20% of a mainframe's processing capability — and up to 40% of main memory storage and disk channel traffic — is consumed in the housekeeping functions of data validation, file compares and updates, and retransmission of incorrect data back to the input site.

If these statistics are accurate, they suggest that as much as $700,000 of investment in a $2-million processor is tied up with data entry preprocessing functions that could be performed for a fraction of that cost at the site-of-entry.

Second, much lower communications line costs. If, for a few dollars per terminal per month, a user can obtain enhanced data validation capabilities, as well as local format storage and record storage under host control, the line cost savings from elimination of format transmissions and their associated polling for these functions alone can more than pay for the incremental costs of the validation and storage features. And with local storage, records can be entered and stored locally and can be batched upline, saving enormously on in-

(Continued on Page 54)

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# Modem Prices Slashed

DANBURY, Conn. — General Datacomm Industries, Inc. has slashed prices on certain modems, citing improvements in production engineering as the reason.

The vendor reduced single-unit prices for its 212A and 201C-M switched network modems by 6% and 17%, respectively. Running at 300- and 1,200 bit/sec, the 212A now costs $810; the 201C-M, running at 1,200- and 2,400 bit/sec, now costs $825.

For private-line modems, General Datacomm reduced the unit price of its standalone 2,400 bit/sec 201-7 by 22% to $695, and trimmed the tag of its rack-mounted 201-7(R) by 27% to $550. The fast polling 4,800 bit/sec 208-9A now goes for $2,795, a 6% reduction.

General Datacomm also lowered the unit price for its 4,800 bit/sec MP208B/A modem from $3,275 to $2,995. The vendor's address is One Kennedy Ave., Danbury, Conn. 06810.

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## *Burroughs Emulated*

OKEMOS, Mich. — A CRT terminal said to emulate the Burroughs Corp. TD830 and MT983 series terminals has been announced by Systems Research, Inc.

The Century is equipped with 20K bytes of random-access memory (RAM) and a 25-line by 80 char. display as well as a 60-Hz refresh rate to minimize eye fatigue, the vendor said.

The detached keyboard includes an Ascii pad and cursor control pad.

The Century CRT terminal is priced at $1,895 with quantity discounts available from Systems Research, Inc., 2400 Science Parkway, Okemos, Mich. 48864.

# Controller Setup Allows Parallelism

*(Continued from Page 53)*

teractive transmission costs.

Third, much better response time. It has become an axiom of 3270-type data entry that poor response time is a given that occurs with aggravating frequency. One of the major stimulants to the response time statistics devices which have become popular in the past year has been the problem of contention delays that often result in 10- to 12-sec waiting time of each 3270-entry terminal during periods of peak load.

These delays usually occur late in the day, when operators at numerous outlying sites begin high-volume entry of the day's records, each of which must be polled and picked from the screen by an overburdened host and front-end processor.

With parallelism, these response time delays can be cut to a third by simply adding local storage facilities that provide two capabilities. One is load-balancing, by allowing operators to write to local media to smooth mainframe polling. The second is batch transmission of record blocks, which is faster, easier and less costly than polling to gather every screen image interactively.

Which brings up the fourth major benefit, significantly higher manpower utilization — as much as 30% per application or site in most cases.

Look at this example. Take a typical outlying data entry site with 20 data entry operators using 3270-type terminals. Assume they are all entering 400 char. of alphanumeric data into a 960-char. format, a task that takes about 70 sec per record.

With normal system traffic, polling, acking and nacking, the average response time is running about 4 sec — or about 2.8% of the total time to execute one record.

At peak times, response times increase to 12 sec — or 8.4% of the entry time, almost a 6% increase. Now multiply that 6% by the number of operators at each site, and you are talking about considerable loss of productivity across a large systems network.

But 6% is only the beginning.

Industry statistics show that about 33 out of every 100 data entry records do not clear the first host editing pass. Half of those are sent back to the local site for further validation and correction — over the on-line network. That's about 15% of each operators work load.

Not only is machine time and retransmission time required to correct these, but operator time is required as well. In this instance, only a single 10-char. field may be the problem, and the entry time to correct it may be under 10 sec. In those cases, during peak load, the 12-sec response time delay is actually more than 100% of the entry time.

When these time considerations are factored into a typical 3270 network, the actual lost time of operators can reach 30% — or more if line outages and routine retransmission requirements are considered. That means, essentially, that the maximum productivity potential of a data entry operator is probably only 70% of his availability and his pay.

### Problem Solving

Parallelism is the first concept that makes it easy to correct these four major problems — and to measure the actual correction immediately.

At one extreme, a parallel system operating exactly like a 3270 system under host control can share all formats and entry locally, for transmission in queued batch mode on host demand which requires special software.

This eliminates screen-by-screen response time delays and all but a fraction of interactive communications costs. It opens operator productivity up to the 100% potential level because screens refresh instantly when in a local mode.

The products required in a parallel system must first be totally compatible with the 3270-type units they are replacing — at the protocol level, at the procedural level, at the screen level, at the keyboard level and at the functional level.

The operators should require no retraining. This is a nonnegotiable starting point of parallelism.

Next, the controller units must offer more capability than the ones they are replacing. This capability is threefold: intelligence, storage and options. Intelligence to perform either limited or extended additional functions locally; storage to permit formats and/or records to be maintained on a local data base; and options, such as the use of printers, wands, tape drives or special-purpose devices needed in the application.

*Ritchay is director of distributed systems for Raytheon Data Systems Co. in Norwood, Mass.*

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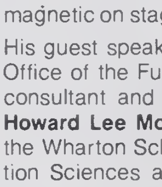

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# Adds' Dumb CRT Terminal Priced at $650 for End User

BOSTON — Cheap, pretty and dumb is the Viewpoint CRT terminal recently announced by Applied Digital Data Systems, Inc. (Adds) here as an alternative to its Regent 20.

Viewpoint's 1,920-char., 12-in. screen tilts to reduce operator strain and is glare-free with an optional $15 filter. The Adds terminal runs at 110- to 19.2K bit/sec in switch-selectable half- or full-duplex modes using the serial RS-232C communications interface.

As a dumb terminal, Viewpoint cannot be programmed by the end user for particular tasks, nor will OEM purchasers find the product easy to modify, an Adds spokesman pointed out. But the end-user price is only $650 and drops to as low as $450 with large-quantity orders, he said.

The terminal is also highly reliable, according to Adds figures, which estimate mean time between failures (MTBF) for basic components to exceed 10,000 hours. That comes to nearly five years if Viewpoint were used eight hours per day, 22 days per month.

Viewpoint will display all Ascii codes received from a host computer, forming the 96 different characters in a 5 by 7 dot matrix. Its detachable keyboard weighs 2 lb, closely resembles IBM's keyboard for the Selectric typewriter and is sculpted to fit the operator's fingertips comfortably, the spokesman maintained. Foreign character fonts are available.

Adds reportedly began developing Viewpoint three years ago, well before NCR Corp. acquired the Hauppauge, N.Y., terminal maker. Inside Viewpoint, a video controller chip made to Adds specifications by Standard Microsystems Corp. of Hauppage works with a Zilog, Inc. Z8 microprocessor to translate incoming data from a host computer into signals that drive the CRT monitor and display characters on its screen.

### Eleven-Chip Design

"The large-scale integration chip makes it possible to contain Viewpoint's entire logic electronics on a single circuit board containing only 11 chips," an Adds engineer explained. A few years ago, he said, similar terminals needed about 300 chips on four or five boards.

This simplified design permitted Viewpoint's low price and the dumb terminal's high MTBF, the engineer indicated.

Adds has decided to sell Viewpoint in one standard configuration, while the NCR company's Regent terminals go mainly to OEM customers with customized paint jobs, firmware and keyboards. Viewpoint will typically run with small business systems, time-shared systems and microcomputers, the spokesman noted.

Adds is located at 100 Marcus Blvd., Hauppage, N.Y. 11787.

Adds' Viewpoint CRT terminal was designed for use in office environments.

# Sigma Brings Out Protocol Converter For RS-232 Users

PLANTATION, Fla. — A data communications protocol converter that allows users to connect terminals into networks using complex protocols has been developed by Sigma Systems, Inc.

The CS-85, usable by equipment utilizing RS-232 interfaces, is also said to allow communications between networks or computers using different protocols.

Some examples of specialized terminals are graphics digitizers, color CRTs, teller terminals, control computers, printers and plotters.

With two- to eight-port versions available, a two-port stand-alone unit costs $1,995 from the firm at 7221 N.W. 11th Place, Plantation, Fla. 33313.

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## *Terminals Join Decwriter Line*

MAYNARD, Mass. — Digital Equipment Corp. has announced three additions to its Decwriter IV line of terminals that offer graphics output.

The terminals, LA34-WA, LA34-VA and LA34-RA, are receive-only units that can produce the screen display from a raster-scan video terminal. An XL extended logic package can be installed in Decwriter IV, Model AA terminals in the field, or it can be ordered from the factory with new terminals, DEC said.

The receive-only terminals are companion hard-copy devices to DEC's VT100, VT132 and Gigi units. The terminals will operate from the printer ports of those models or directly from a host processor, the vendor said.

The LA34 line is priced from $1,550; the XL option costs $250. Further information is available from DEC, Maynard, Mass. 01754.

### *Real-Time Information*

# Net Monitor Handles 256 Lines

DES MOINES, Iowa — ESP Digital Systems Corp. has introduced the 3709 Network Performance Monitor (NPM) system, a network management system that measures the performance of a telecommunications network by monitoring all data signals between the user's front-end processor and the data sets.

This real-time information permits users to trap and diagnose line and equipment problems, to view the operation of the entire system at once and to trace the system's productivity and growth, according to ESP.

The 3709 NPM monitors up to 256 communication lines. Protocols currently available include 3270 BSC, 3270 SDLC, 2741 Async, BSC Contention, 3780 BSC and HDLC. Line speeds to more than 56K bytes are available, and the system interface is via patch panel or RS-232 connector with RS-449 or CCITT V.35 optional. The standard system CRT utilizes 16 function keys, with color CRT terminal optional.

The 3709 NPM can pinpoint terminal, modem and line problems easily, solve daily operational problems and identify any chronic teleprocessing system-related bugs, ESP said.

The 3709 NPM starts at $25,000 from the vendor at 1427 W. Army Post Road, Des Moines, Iowa 50315.

# UDS Adds Direct-Connect Modem

HUNTSVILLE, Ala. — A direct-connect modem, capable of full-duplex operation at 300 bit/sec and providing automatic answer service has been added to Universal Data Systems (UDS) LP series of telephone line-powered units.

The modem, UDS 103JLP, is certified for direct-connect operation under FCC Part 68 regulations.

A manual switch on the new model back panel selects either originate or answer frequency pairs; regardless of how the switch is set, the modem will automatically answer incoming data calls in the answer mode when the front panel selector is set to data.

The UDS 103J LP costs $245 from UDS, 5000 Bradford Drive, Huntsville, Ala. 35805.

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Dr. Jensen is an international authority and lecturer in the field of software engineering. He has been involved in airborne computer hardware design, circuit and system simulation, and software design. He is chief scientist in the Defense Systems Division of Hughes Aircraft Company's Space and Communication Group, where his primary function is director of software engineering and research.

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# DG Unit Acts as Controller Or Stand-Alone Micronova

WESTBORO, Mass. — An intelligent terminal from Data General Corp., said to be usable as a stand-alone Micronova system or a cluster controller, reportedly suits a wide range of applications.

The Model 5100 can also be used as a remote intelligent subsystem with down-line loading, local disk or diskette storage, a company spokesman said. The unit is user-programmable, operator-oriented and compatible with standard DG hardware and software.

The terminal uses a Micronova MP/100 backplane, permitting the use of MP/100 peripherals and interfaces, including diskettes, disks and communications options.

Depending on the model, the unit has 8K- to 64K bytes of random-access memory and sockets for up to 32K bytes of erasable programmable read-only memory. Prices range from $4,710 to $6,750 from the vendor at Rt. 9, Westboro, Mass. 01581.

## *Visual 110 Emulates DG*

ANDOVER, Mass. — Visual Technology, Inc. has announced a microprocessor-based terminal which it said emulates the full range of Data General Corp. Dasher terminal products.

The Visual 110 features 80- or 132-col display, Ansi X3.64 mode of operation, split screen, CRT terminal saver feature, split bit/sec rates and programmable light-emitting diodes, the company said.

Use of nonvolatile random-access memory allows for the elimination of all but the Off/On switches, according to the firm.

The Visual 110 is priced at $1,695 with quantity discounts available.

Visual Technology, Inc. is headquartered at Railroad Ave., Andover, Mass. 01810.

# Modem Runs 1,200 Bit/Sec

CARRBORO, N.C. — Datec, Inc. has announced a 300 or 1,200 bit/sec modem that offers full- or half-duplex transmission and reception over two-wire networks or two-wire leased or private-line systems.

Features include Bell 212A compatability in the 1,200 bit/sec range and a control feature for Key-Phone systems, the vendor said.

The modem costs $795 for a stand-alone unit or $695 for a rack-mountable model, the vendor said from 300 E. Main St., Carrboro, N.C. 27510.

# Users Describe Local Nets

*(Continued from Page 53)*

ken method because it is reportedly more efficient than a polling method. A system with 32 stations connected over a 10-kilometer loop has a transmission efficiency of 72% and throughput as high as 900K byte/sec, they said.

The Hitachi DFW is used at Nippon Steel for steel-making process control; one for cold rolling mill process control is under development.

### Fujitsu, HP

Fujitsu Laboratories, Ltd. is developing a duplicate loop scheme, DS 1, to interconnect minicomputers. A parallel-line communications interface (PLC) can operate at several hundred kilobyte/sec under direct memory access control, Fujitsu claimed.

The transmission rate of the highway is set at 13.44M bit/sec, and total network throughput of 1,500K byte/sec has been confirmed.

Potential applications include packet switching for a new international public data transmission called Venus and for Japanese newspaper typesetting. Anarchy, another fiber-optic scheme thus far not in use, was developed as a project at HP. Anarchy was designed for use in nets exceeding 100 nodes with transmission rates of 100M bit/sec or more and spanning distances up to 10 kilometers, according to HP's Randy Neff.

Anarchy consists of an arbitrarily connected local net with the connection between nodes consisting of bi-directional point-to-point communication links. There are two independent unidirectional fiber-optic conductors, one for messages in each direction between the nodes, Neff said.

When a node wants to send a message, it "attempts to flood" the network with the message. A free node then transmits the message and returns a "message-arrived" signal to the originator. A timeout mechanism alerts the originator to repeat a message that doesn't reach its destination.

It is possible for the network to have several messages being transmitted simultaneously as each message selects a path avoiding a node that is already busy. However, short messages need to be padded in order to avoid a situation in which they could circle forever in a loop, he added.

*Upton is editor of "EDP Industry Report," an International Data Corp. publication.*

BY ALAN I. SALTMAN

# Hiring Contract Programmers

## THE LEGAL ISSUES

In the expanding market of the 1980s, industrial companies, financial institutions, utilities and other corporate and governmental units are relying more heavily upon data processing to handle their information needs. In the face of this expanding market, there is already a shortage of qualified programmers, systems analysts and other specialists. As the shortage of qualified personnel becomes more acute, very few organizations will be in a position to hire, train and retain a full staff of qualified DP professionals.

> *Congress has not yet determined the definition of an independent contractor, but the IRS has. These criteria must be met if a company is to avoid unforeseen tax liability.*

A new field of professional information management has been borne out of this growing demand. Since its birth, this new industry has grown in excess of 25% each year since 1975. In 1979 alone, professional DP service companies provided more than $1.5 billion in products and services in the U.S.

As the business world becomes more computerized and the demand for the talents of well-trained DP personnel grows, it is expected that organizations that rely upon DP will turn more frequently to one of the many companies which comprise the professional software services industry for software and programming services.

### Individual Suppliers

However, as in any new industry borne of such a great and growing demand, individual entrepreneurs have appeared. These individual software services suppliers would for various marketing reasons prefer to call themselves "independent contractors." However, the term "free-lancers" has more appropriately been applied to them since a large portion of such suppliers are neither "independent" nor "contractors" in the legal sense of those terms.

Moreover, the uncertainty of the legal relationship between these individuals and the company in need of DP services is further confused by the fact that free-lancers frequently work through another group of individuals who call themselves "brokers," that is, marketing agents to whom free-lancers pay a portion of the fees they collect from jobs the brokers have found for them.

The organization in need of DP personnel to handle its information needs is, thus, presented with a choice — use established professional DP companies or use free-lancers/brokers. In either case, the organization should consider the legal ramifications in making its choice.

Before retaining the services of an individual who calls himself an "independent contractor" to handle a DP requirement, a company must have a clear answer (less it assume the risk of substantial embarrassment and liability) to the question of whether or not he is, in fact, an independent contractor.

### IRS Criteria

While Congress has not, as yet, determined for all purposes what the definition of a legitimate independent contractor should be in this area, the Internal Revenue Service (IRS) has established its criteria. These criteria will be consistently applied on a case-by-case basis by the IRS and must be met if the organization is to insulate itself from unforeseen tax liability.

The criteria are:

1. Is the individual who provides the services required to comply with instructions as to when, where and how the work is to be performed?
2. Is the individual given training to enable him to perform a job in a particular method or manner?
3. Are the performed services integrated into the operations of the business?
4. Must the individual render the services personally?
5. Does the business hire, pay or supervise assistants to help the individual performing the services under contract?
6. Is the relationship between the individual and the person for whom he performs the services a continuing relationship?
7. Who sets the hours of work?
8. Is the work performed at the place of business of the potential employer?
9. Is the individual required to devote his full time to the person for whom he performs the services?
10. Who directs the order or sequence in which the work must be done?
11. Are regular oral or written reports required?
12. What is the basis for payment — hourly, weekly, on commission or by the job?
13. Are business and/or traveling expenses reimbursed?
14. Who furnishes tools and materials used in providing the services?
15. Does the individual providing the services have a significant investment in facilities used to perform the services?
16. Can the individual providing the services realize a profit or a loss?
17. Can the individual providing the services work for a number of firms at the same time?
18. Does the individual make his services available to the general public?
19. Is the individual providing the services subject to dismissal for reasons other than nonperformance of contract specifications?
20. Can the individual providing

(Continued on In Depth/2)

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*(Continued from In Depth/1)*

services terminate his relationship without incurring a liability for failure to complete a job?

### Ad Hoc Decision

No one single factor among these criteria is determinative. The IRS will decide, on an ad hoc basis, whether the individual is an employee. In one case, the circumstances may dictate a finding of an employee/employer relationship based upon only five of the criteria. In another (unlikely) case, circumstances may compel the determination that the person is an independent contractor even though a seemingly greater number of the criteria indicate an employee/employer relationship.

The bottom line is that the criteria do not establish a uniform formula which may consistently be applied with no fear on a contradictory result. However, the criteria may give a client organization a "feeling" of how the IRS will classify its conduct.

For broader purposes, the General Accounting Office (GAO) has recommended to Congress four criteria which, it suggests, an individual should meet in order to be treated as an independent contractor and, hence, his client as other than an employer. Under the GAO suggestion, the individual must:

1. Have a principal place of business other than that furnished by the person or persons for whom he performs or furnishes services. Under this test, an individual's home would not qualify as a separate place of business unless it qualifies under IRC § 280A as to deduction of certain expenses in connection with business use of the home.
2. Maintain a separate set of books and records that reflect all items of income and expense of his trade or business.
3. Assume the risk of suffering a loss and the opportunity of making a profit.
4. Hold himself out in his own name as self-employed and/or make his services generally available to the public.

If only three of the four enumerated criteria are met, determination of the individual's status will be governed by common-law rules. If fewer than three tests are met, an employer/employee relationship exists unless a specific exclusion in the law mandates a contrary result.

It is also important to take note of the fact that many state courts and administrative agencies apply a common-law "right-of-control" test in determining the status of such individuals. A general application of the common-law rule is that an individual will be found to be an employee and not an independent contractor if he is subject to the will and control of the employer, not only as to *what* shall be done, but *how* it shall be done.

### Justice's Proposal

The Justice Department has also made a proposal regarding this matter. The Justice Department's view is that an individual receiving remuneration primarily for personal services integral to the payer's trade or business would be treated as an employee if the individual neither:

1. Has a substantial investment in property (other than facilities for transportation) used in connection with the performance of such services; nor
2. Has a substantial risk of loss; nor
3. Has a principal place of business used in connection with the performance of such services other than one furnished by the person for whom the services are performed.

While an "independent contractor" may represent that such status offers significant tax and legal advantages to

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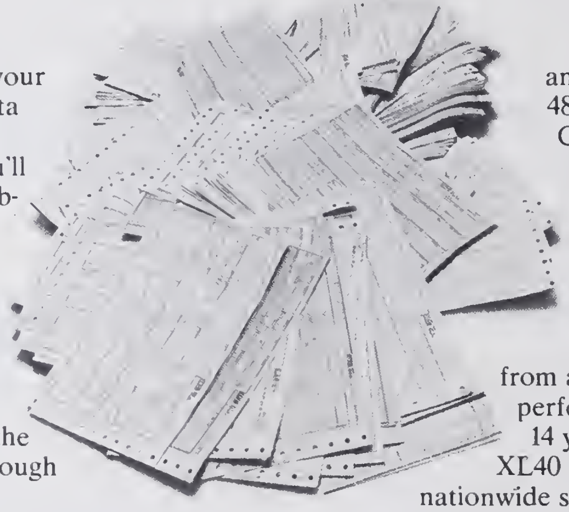

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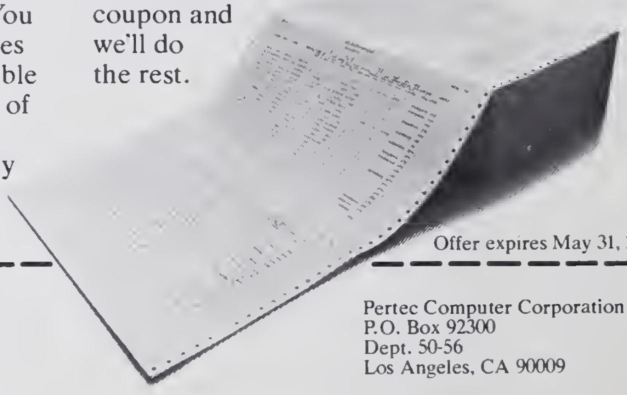

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a client organization using his services, these advantages immediately become serious liabilities when such an individual fails to meet the required test and is held to be an employee of the company.

Some examples of an employer's potental liability include a responsibility to pay Social Security tax on the free-lancer and withhold federal and state taxes (or be assessed a penalty of up to 100% for failure to withhold). In addition, employers are responsible for paying workman's compensation and unemployment taxes and must comply with applicable state and federal wage and hours laws and record-keeping requirements.

Moreover, if the employer maintains a policy of paying all or part of its true employees' health-care plans, retirement plans or other tax-deductible fringe benefits, then he must also pay for the free-lancer. Plus, IRS-qualified pension plans would forfeit their tax benefits to members if a free-lancer held to be an employee were excluded. Employers might also find themselves faced with financial liability following the death of or injury to a free-lancer employee.

A recent case in point involved a large California company which could do little except watch helplessly as an "independent contractor" it had used suddenly became an employee. The impact was staggering. The work had proceeded smoothly with the "independent contractor" until he filed for workmen's compensation.

Unfortunately, once the government became involved, the only thing that went smoothly was the organization's money — smoothly down the drain. First, it was assessed for taxes and Social Security which had not been withheld. Then, a 100% penalty was assessed on that amount. Finally, the organization was subjected to a full-scale audit.

All of this happened because it had turned to an "independent contractor" when seeking to fill DP needs. Today, this organization relies exclusively on professional services companies.

In view of these and other risks, a client organization must be assured that all of its contractors are truly independent. Finding out after the fact that this was not the case may be an expensive lesson.

### Working With Broker

As mentioned earlier in this article, many free-lancers work through an individual who operates as a "broker." Organizations hiring a free-lancer through a broker face problems similar to those discussed above.

Most frequently, such a broker will indicate to potential clients that the individuals he furnishes are his employees so as to give the client at least the impression of being insulated from the free-lancer/employee problem. However, even in this situation, if the client organization is not extremely careful about with whom it is dealing, how it structures the deal and how it administers this type of an arrangement, the organization may find that it is a "joint" employer of the broker's employee(s).

Failure to handle such an agreement properly will result in a finding of responsibility by the client organization (in addition to the broker) for compliance with wage and hour laws and income tax and Social Security withholding for the broker's employee(s). In addition, the client organization will also face the legal problems that have been discussed above.

Some factors which are significant and should be considered by a company when considering the question of whether or not it will be designated as a joint employer are:

1. Who determines the assignments of individuals to specific tasks.
2. Who supervises the individuals on a day-to-day basis.
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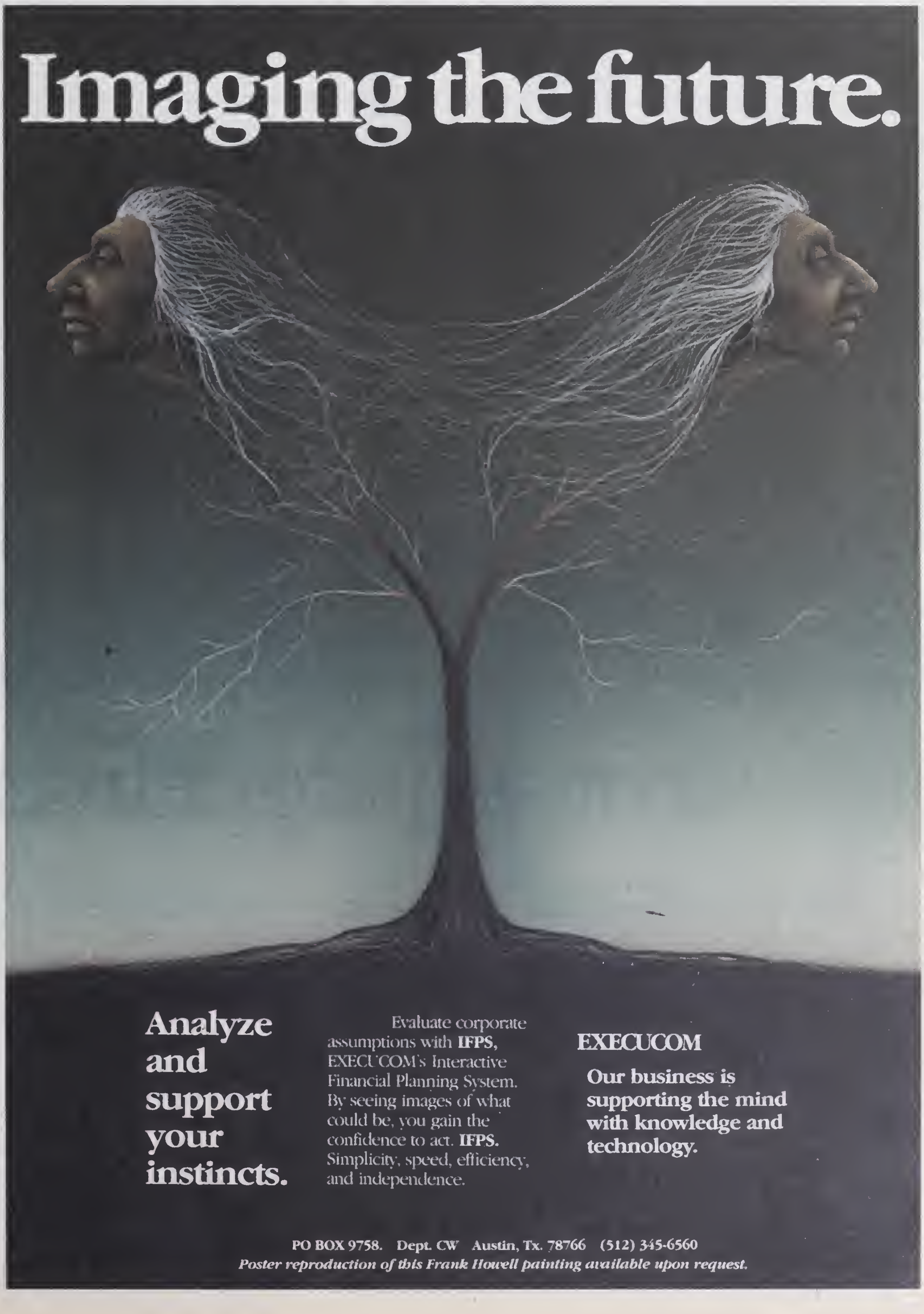
More significantly, however, the use of brokers intensifies a major problem a corporation faces when retaining free-lancers. Whether the client likes it or not, free-lancers do tend to influence members of the corporation's own DP staff either directly or in-

*(Continued on In Depth/6)*



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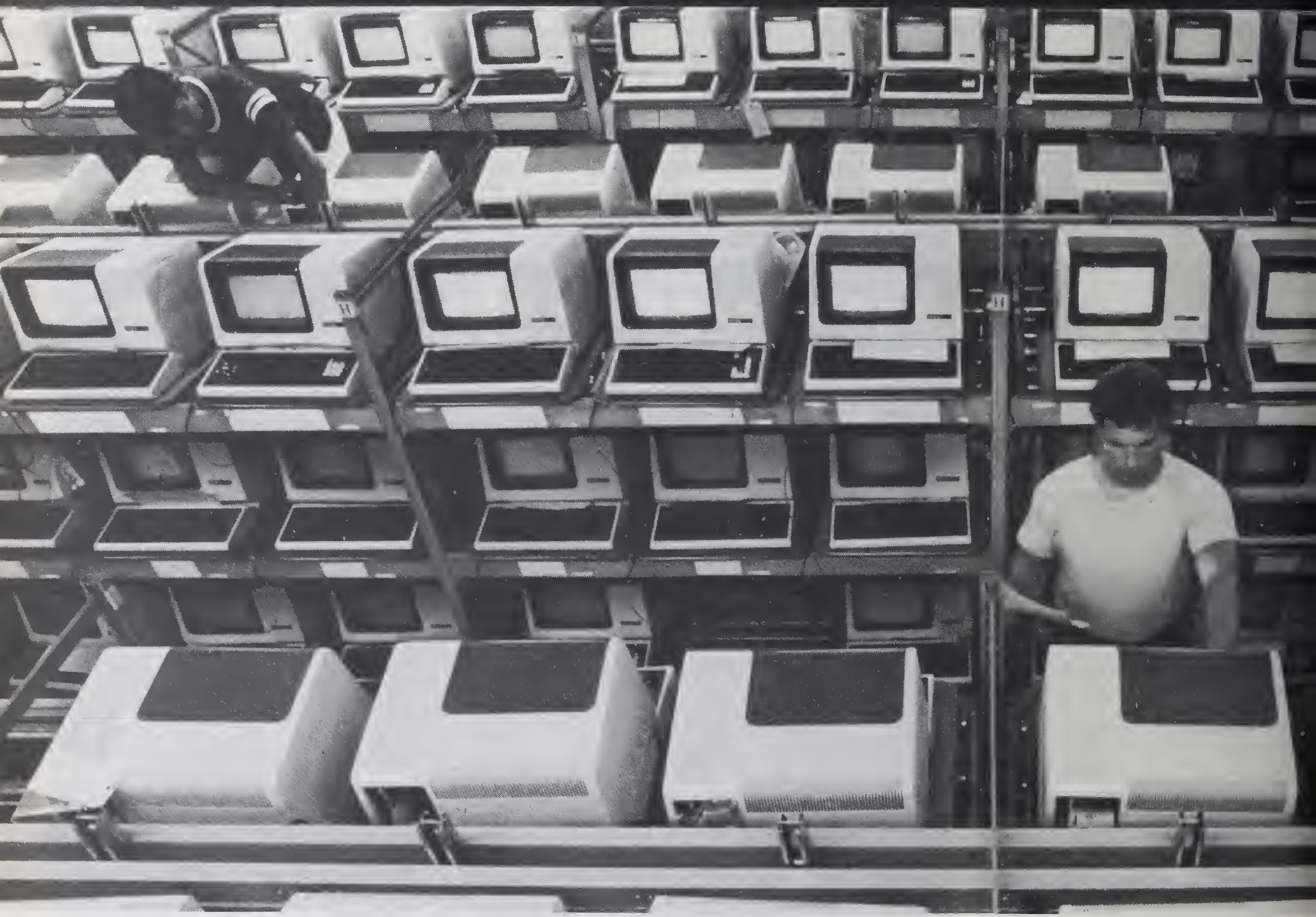

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*(Continued from In Depth/3)*

directly, causing them to resign from their positions and become free-lancers in the interest of increasing their own incomes.

### Other Problems

Free-lancers individually, or with broker management, present other problems to a client organization. That is, even if a free-lancer does meet the independent contractor tests, the individual still presents a series of serious problems to the client organization. From a management perspective, the impact of such an individual upon the staff and personnel of the corporation must be considered.

Indeed, one client company that utilized free-lancers on a particular project discovered that the free-lancer's presence was having a "ripple impact" upon its own staff to the extent that before the project was completed, many of the employees assigned to the project had left the company to become free-lancers themselves. Needless to say, such a turnover was very costly.

In addition, corporate management faces the problem that the objectives of the free-lancers differ from the corporate goals and may undermine the team aspects of a highly professional group. Such a "morale" problem is recognized by the U.S. government and prompted its prohibition of federal personal service contracts, thus banning the usage of contractual personnel in an employee-like relationship with the government. Likewise, such free-lancers may jeopardize the authority of corporate controls that are needed in any well-managed organization.

Since, in many cases, brokers for all appearances may at least try to resemble the national professional service companies, a client organization would do well to thoroughly check out any potential supplier of DP services.

In particular, references from other clients should be obtained to ensure that the DP company is qualified and reputable. In doing so, the client should satisfy itself that a corporate entity exists which will stand behind the work.

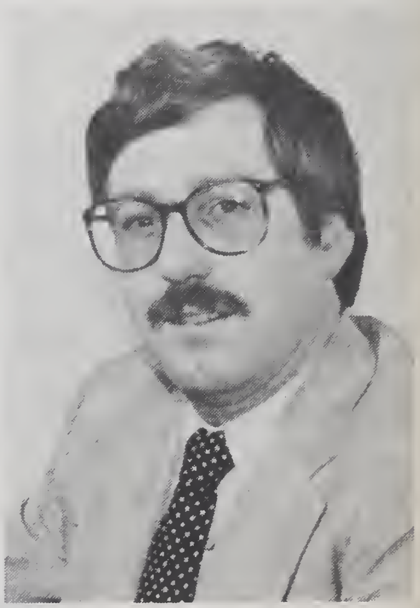
### Other Checks

After checking the company's background, but prior to entering into an arrangement, the client organization should assure itself that the DP company not only accepts the legal and financial responsibility for all tax and benefit payments of its workers, but also is actually complying with the appropriate laws and is sufficiently well financed to meet its responsibilities.

Finally, the client organization should unequivocably establish a true client/independent contractor relationship with the professional services firm by executing a written agreement and thoroughly discussing the potential arrangements both with legal counsel and appropriate government agencies.

It is important to remember that the courts and government agencies examine the facts of each case in determining whether or not an independent contractor/client relationship exists. *Contract language alone will not establish such a relationship.*

All factors will be considered by the courts and agencies, so it is important that a client organization protect itself on all fronts.



*Alan I. Saltman is a partner with the law firm of Saltman & Stevens in Washington, D.C. Saltman specializes in government contract law.*

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# IBM's Software Strategy For Large Systems Users

BY MICHAEL AMADIO

IBM's moves in system and application software have influenced both the data processing community and the software industry for years. We can expect IBM's software decisions to continue to affect computer users and software vendors in even greater measure in the years ahead, owing to the company's large investment in the development of its software products and their supporting organizations.

On one hand, IBM dictates to a great extent how users develop computer applications and to some extent what software products they can choose from independent software vendors.

For example, a representative from a large computer installation explained to a recent IMS user group meeting how and why his site decided to adopt the IBM data dictionary. This site already had five data dictionaries, all non-IBM products, acquired to satisfy requests from end-user departments. But when forced to decide what product it should commit itself to, the installation selected IBM. The reason? DP management believed that in the '80s, IBM's data dictionary will be the core of the IMS strategy.

On the other hand, IBM can impact the independent software industry by offering products that are directly competitive with those from independent suppliers, changing the environment for developing and running computer applications and introducing new hardware that is application-dependent.

### Areas of Impact

IBM is influencing the market for data base management systems (DBMS) with IMS. Although IMS may not be the most attractive system in the market, it is nevertheless the single most widely used DBMS.

TSO and VM/370 affect the way programs are entered and tested; they establish a de facto, on-line and conversational standard for application preparation.

Operating systems enforce the rules to which independent software must submit when running on IBM's computers. The introduction of an improved operating system such as DOS/VSE or of a new or enhanced spooling system is most likely to impose changes on software products.

In addition, new devices, such as new terminals or new storage units, must be supported by foreign software products.

Changes to user applications and software products induced by IBM cannot be prevented. Nor can they be developed until such actions are revealed by IBM and corresponding implementation gradually takes place in the field. But studying IBM's past moves, observing trends and speculating on IBM's software strategy can help anticipate those changes and help build extra flexibility into the design of user applications and software products so that the negative effects of those changes are minimized.

> *Changes to user applications and software products induced by IBM cannot be prevented. But studying IBM's past moves, observing trends and speculating on IBM's software strategy can help anticipate those changes and help build extra flexibility into the design of user applications and software products so that the negative effects of those changes are minimized.*

### Driving Forces

IBM's software strategy is shaped by three main forces:

- The demands of almost 20,000 user installations worldwide.
- The need for continued hardware revenue and profit growth.
- The increasing cost of developing and maintaining mainframe system software combined with competitive pressure for hardware price reduction.

IBM users have invested considerable effort in developing computer applications, and they refuse to accept changes that cause massive program redevelopment. New operating systems or substantial enhancements of existing ones must ensure upward compatibility and gradual migration to new upgraded systems.

Users are active in national and international organizations such as Guide and Share, and they have formed strong local user groups that cover almost every possible facet of IBM's software. These users submit requests for software modifications, and recent new releases of major IBM products, such as IMS and ADF, show that user influence has become a determining factor in IBM's software maintenance and development plans.

Existing investments in hardware R&D and in manufacturing facilities make IBM still primarily a hardware company. Thus, revenues and profits from hardware rentals, leases and purchases must continue to grow. To ensure this growth, IBM will obsolete existing hardware with more powerful equipment. In turn, these new computers and new devices will obsolete existing applications, which will have to be rewritten in order to take full advantage of the new hardware.

This necessity will soften the resistance to new software that may be necessary to support new system architecture. This software will provide a migration path that basically saves existing knowledge and expertise. There are abundant examples of these types of changes that both are repercussions of and support hardware evolution.

The increasing use of terminals in end-user departments will promote changes in conversational teleprocessing monitors and in end-user application software. Distributed processing in IBM's Systems Network Architecture (SNA) environment will foster changes in operating systems, data communications and data base software and will create the requirement for new system software that aids in developing, monitoring and managing network-based computer applications.

Finally, the growing cost of developing and maintaining software, coupled with a competition-driven hardware price reduction, is forcing IBM to look at software as a self-standing profit unit.

The progressive unbundling of all software components is gradually changing user habits and making the idea of paid-for software universally accepted. Although a move by IBM to become more heavily involved in the software business is a threat to some independent vendors, overall it may have a beneficial effect on the industry by removing artificial pricing limitations that constrain the price of many independent products, the profitability of their suppliers and eventually the quality of the service users receive from the independent vendors.

### Economics of IBM Software

In 1979, IBM's revenues from DP were $18 billion. Of that total, approximately $500 million — or about 3% — represented revenues from rentals of product programs and application programs.

Many industry observers have been predicting that in the late 1980s, IBM will derive 50% of its DP revenues from the software business.

Although software products will be of growing importance to IBM, we do not believe the company will be primarily in the software business by the end of the decade. We do believe, however, that IBM is in the process of making software a profitable business.

Assuming that IBM's DP revenues will be growing at the rate of 10% per year, by 1987 software revenues would amount to approximately $20 billion. This is 33 times higher than the 1979 estimate and represents a compounded growth rate of 50% per year.

On the other end, at 50%, hardware revenues also would be approximately $20 billion in 1987. This is barely above the 1979 level and on a slowing trend.

In the future, IBM software will play a dual role. On one side, it will generate revenue and profit. Today, IBM system software has grown so complex that it is not only hard to use, but difficult to manage from IBM's maintenance and development point of view.

*(Continued on In Depth/8)*

*(Continued from In Depth/7)*

Nonstandard interfaces, contradicting functions across products and other similar inconsistencies and incompatibilities provide the motivation for overhauling the architecture and directing future development efforts along the line of one consistent software strategy. This will be extremely expensive and will put additional pressure on making software a profitable business.

On the other side, software will be a tool for selling more hardware. For example, VM/CMS and TSO-SPF make terminal usage more attractive for end users and programmers respectively and thus promote terminal installations. In turn, more terminals connected to in-house computers create the demand for larger, more powerful machines.

### Historical Considerations

All of IBM's major current software products have their roots in systems that were born years ago, as far back as 1965 when the first 360 machines were delivered. These older systems are the source of some of the good points and most of the limitations to be found in the current software of medium-to-large IBM mainframes.

The OS/360 operating system provided programmers with good facilities for accessing all major hardware functions in a batch environment. Unfortunately, this same philosophy is carried over in subsequent operating systems, in environments other than batch, and in a time with a substantially different price/performance relationship. OS/VS1, OS/VS2 and then OS/SVS and OS/MVS suffer from the original, hardware-oriented OS/360 approach.

OS/360 placed greater emphasis on hardware usage optimization than on ease of use. Now the development and maintenance of applications is more expensive than hardware, and the reverse would be more appropriate. The original OS/360 trade-off of ease of use for hardware efficiency is now an impediment to increasing programmer productivity.

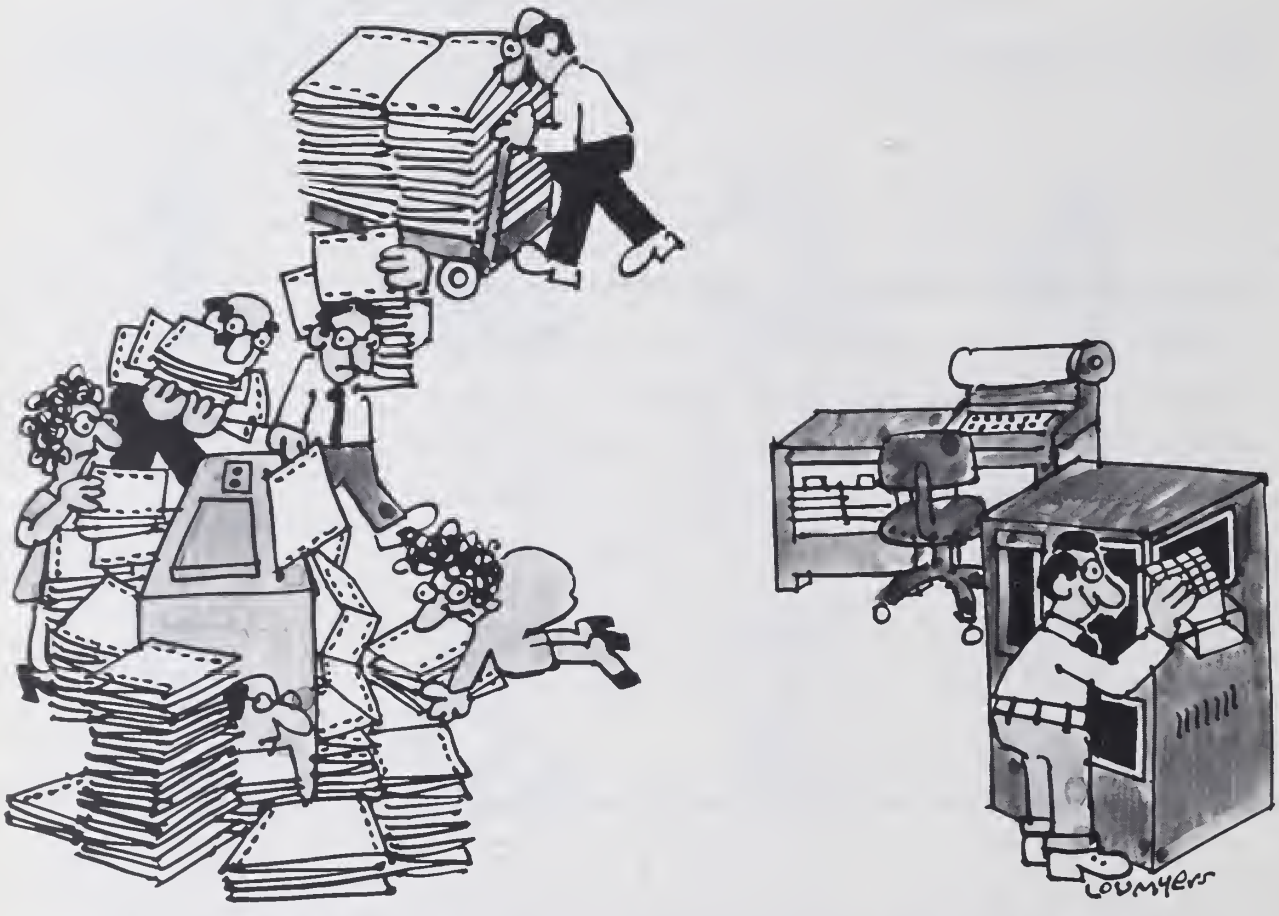
Similarly, on-line program development was originally supported by IBM with the Time Sharing Option (TSO) of OS/360. The system was improved over the years with the availability of VS and full-screen terminals. The current Structured Programming Facility (SPF) of TSO is a very significant advance over the earlier version of this system.

Another terminal monitor, VM/CMS (Conversational Monitor System), also originated several years ago. VM/370 with CMS is a derivative product of CP/67, a system that ran on the 360/67.

To add to the complexity of this software evolution, IBM's products for data base and data communications are not original IBM developments. Both IMS and CICS are field developments. They have been generalized and improved, but their interface with the operating system remains complicated and confused.

### Operating Systems

Currently, about 90% of all OS IBM CPUs run with a VS operating system — either VS1, SVS or MVS. OS/MFT and OS/MVT, the prevalent systems only five or six years ago, have been



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progressively replaced as users migrated from 360 to 370 and 30 series machines.

The predominant operating system in use today is OS/MVS. By the end of 1979, it was running on approximately 60% of IBM CPUs, as opposed to less than 10% in '75.

As mentioned above, this evolution is in good part dictated by hardware migration. OS/MFT and OS/MVT can run on both 360 and 370 hardware, but OS/VS1, OS/SVS and OS/MVS run only on 370s. SVS has been an interim system for MVS users, and installations are now clustered on VS1 and MVS. The first system is more commonly used by 370/148 and 3031 users, the second by users of larger mainframes.

Figure 1 shows how OS operating systems are typically used by 370 and 30 series mainframes. The chart deals only with those machines running OS. This is normally the case of the 370/158 and larger CPUs. In the case of the 370/148, about 40% of all users run DOS/VS, and the chart shows the operating systems used by the remaining 60%, OS users. Smaller CPUs typically run with a DOS operating system and have not been included in the chart.

### Data Base

About 75% of OS users have installed a DBMS. In the majority of cases, it is IBM's IMS, but products supplied by independent vendors are also very popular, and home-grown systems are still employed by a small but not negligible portion of users.

At larger, typically multi-CPU sites, more than one DBMS is in use. When this happens, IMS is commonly the primary DBMS, and it is used for all major production applications.

However, proportionally, IMS users have slowly lost ground in the most recent past as independent DBMS have become more popular.

The expectations for IBM's relational DBMS (in beta test at a handful of sites), the negative image of IMS and the aggressiveness of independent DBMS vendors all contributed to a growth rate higher for independent products than for IMS in the last couple of years.

Among the independent DBMS, the top five in order of popularity (number of users) are Cincom Systems, Inc.'s Total, Software AG's Adabas, Cullinane Data Base Systems, Inc.'s IDMS, MRI Systems Corp.'s System 2000 and Infodata Systems, Inc.'s Inquire.

### Data Communications

Unlike data base, data communications software for production applications is dominated by IBM with CICS and IMS/DC. CICS can be used with both standard file and IMS data base applications and is the most widely adopted data communications monitor. IMS/DC runs only with IMS/DB and has fewer installations.

As with DBMS, larger, multi-CPU installations quite often use more than one data communications monitor.

Industry figures on the evolution in usage of data communications monitors show a relative increase in the level of penetration of both IBM and non-IBM products as opposed to a reduction in the proportion of homegrown systems.

### Program Development

Program development can be looked at from two sides:

- Mode of program development.
- Tools for program development.

Programs can be developed in a batch mode or on-line using CRT or other interactive terminals. On-line is by far the prevalent mode of program development today. Terminal operations and program entry are performed under the control of conversational monitors.

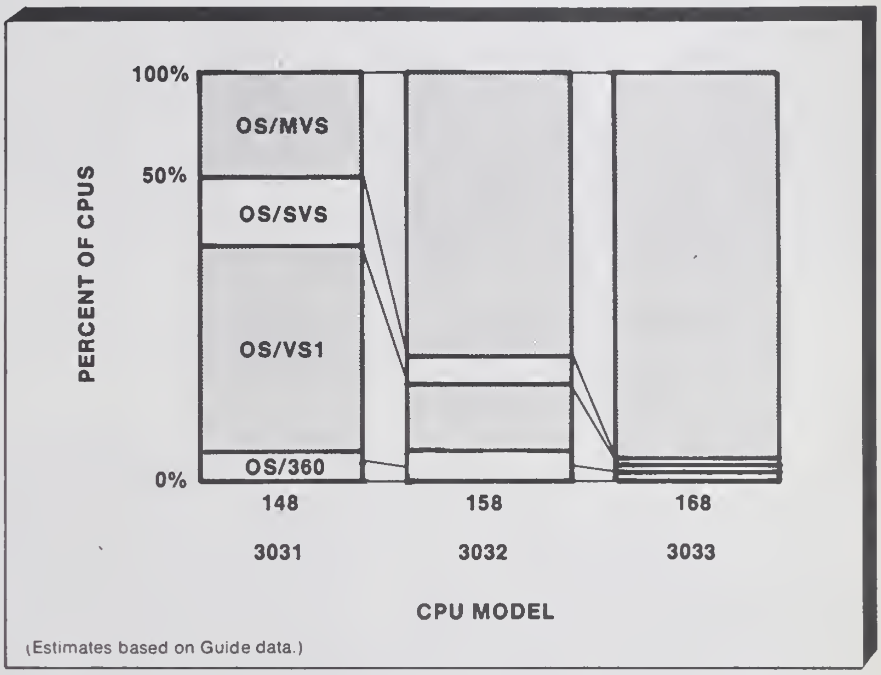
Although a few independent products have been relatively successful in this area, the systems predominantly used are IBM's. TSO is the most common conversational monitor in use, and VM/CMS is starting to gain in popularity — a fact that can be related to the increasing direct involvement of end users in DP.

### Development Tools

Tools for program development are either traditional procedural programming languages or software products that replace or complement languages in the implementation of computer applications.

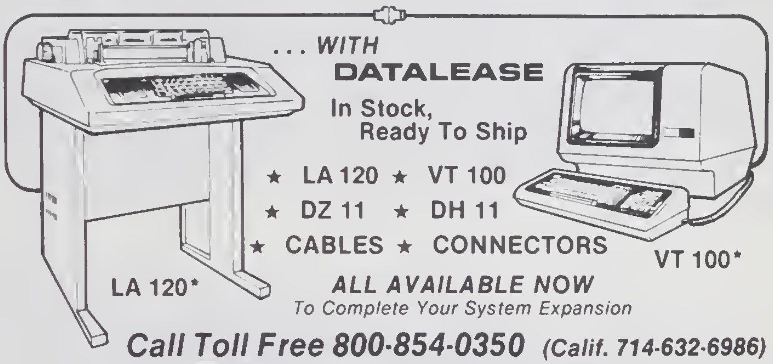
Cobol has been and still is by far the most commonly used programming language. Attempts to replace it with other languages, such as PL/I, have had very little success, if any. However, the increase in on-line and data base applications is readying the DP

(Continued on In Depth/12)



(Estimates based on Guide data.)

Figure 1. Distribution of OS Operating Systems by Model of CPU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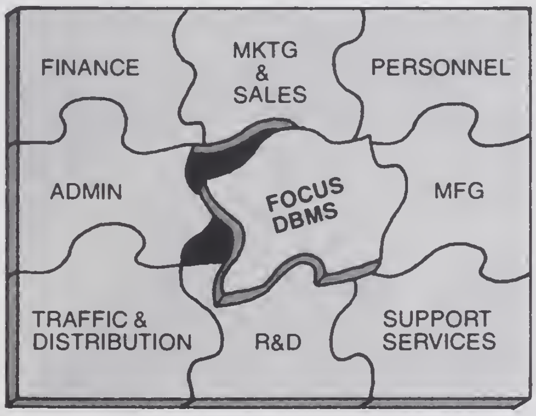

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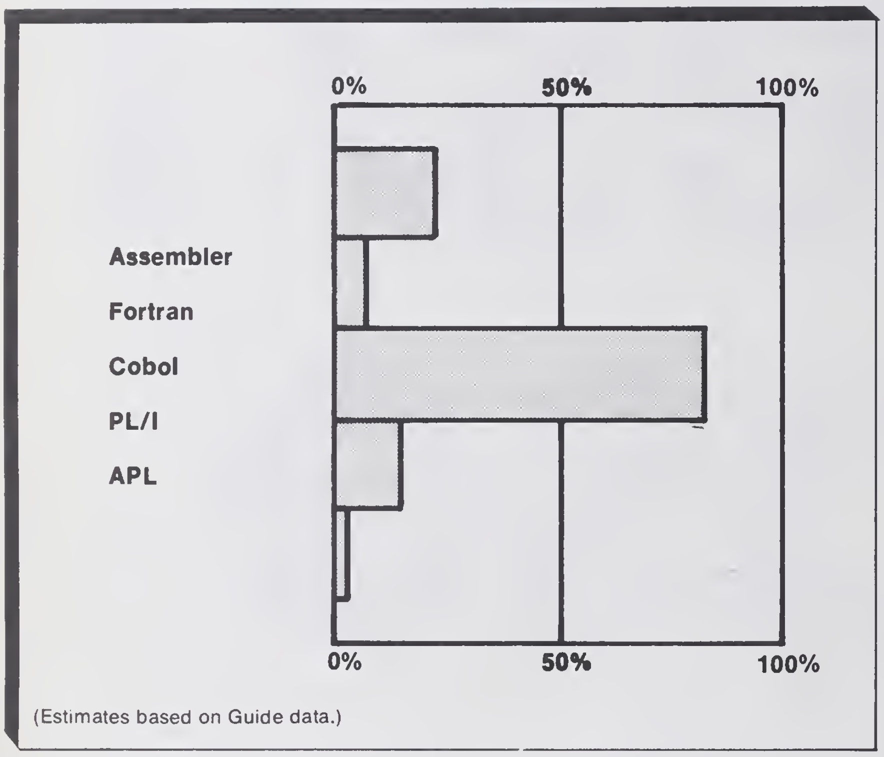


Figure 2. Primary Procedural Programming Language in Use

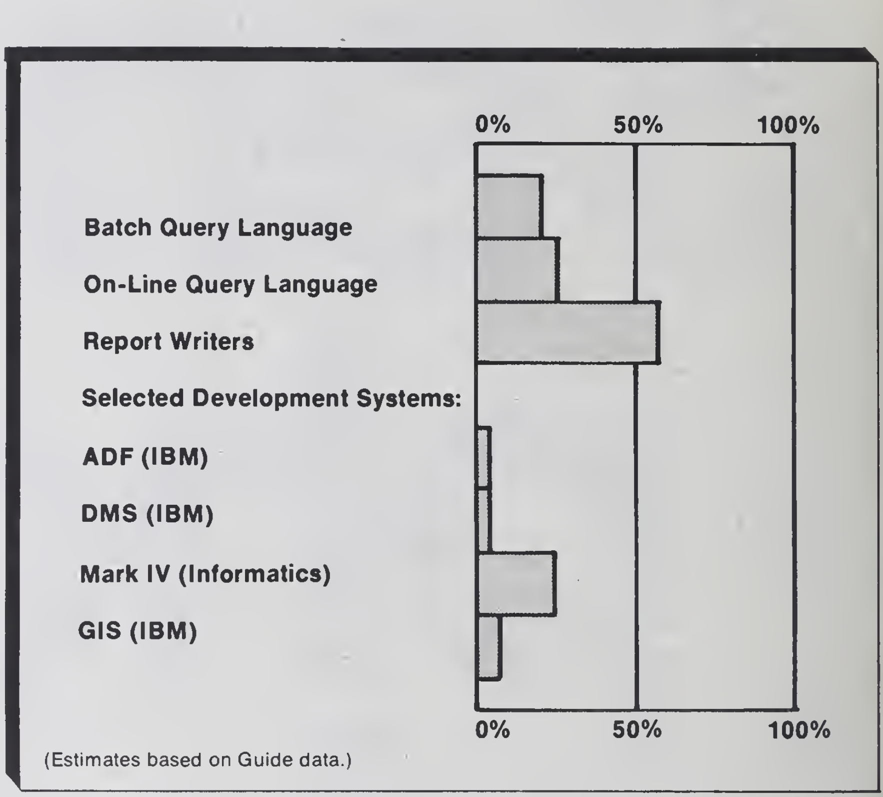


Figure 3. Usage of Tools for Application Development

*(Continued from In Depth/9)*

community for considerable changes in the area of programming tools.

Developing applications for the CICS and IMS environment requires additional expertise almost equivalent to the knowledge of a new and different language. This has created the need for higher level languages that free application programmers from the need to know the details of the data communications monitor and the DBMS.

There are various kinds of products for different applications, and they differ enough in function and capabilities that more than one system can be used at the same computer site. For example, a query language, a report writer and an application development system address different needs and facilitate the work of different individuals.

The current situation with regard to tools for application development is summarized in Figures 2 and 3. The first chart shows percentages of use of programming languages, and the second shows the penetration of selected higher level development tools at OS installations.

The products that have achieved a higher level of penetration, query languages and report writers address very specific needs, such as ad-hoc file interrogations and one-time reports, that are easily isolated. In addition, these applications often directly involve end users as opposed to professional application programmers.

Application development systems for DP professionals are presently used at very few sites with the exception of Mark IV, a product of Informatics, Inc. for the development of batch applications. GIS is an IBM product that has been around for several years but has never become popular. ADF and DMS are both IBM products for the development of on-line IMS and CICS applications, respectively.

Products similar to ADF and DMS are also available from independent software suppliers, but so far they have been installed in relatively small numbers.

### Distributed Processing

IBM has promoted a vision of distributed applications that is highly centered on distribution of data bases with centralized control. In IBM's view, distribution without strong centralized control is in conflict with the notion itself of a data base-oriented organization. As a repository of company information, the data base is a resource that must be made available throughout the organization; but the consistency, integrity and timeliness of the data can only be ensured through strong central control.

IBM supports the idea of processors connected in an SNA network where one location can be identified as central and has responsibility for controlling the data base. Such a central installation would have one or more larger computers and the rest of the sites in the network would have smaller computers, for example, 4331s. The data base would be kept at the central sites and copies of the data base or significant subsets of it would be downloaded to the distributed sites and periodically refreshed.

The IMS and CICS technology currently being made available support this approach. Users, especially large users, are very interested in the distributed processing concept, but very little has been done in implementing networks and network-based applications.

### Operating System Strategy

Although MVS, VS1 and VM/370 will be the IBM operating systems of the future for medium-to-large computers, in the longer range it is unlikely that IBM will continue to support three major different, largely incompatible operating environments.

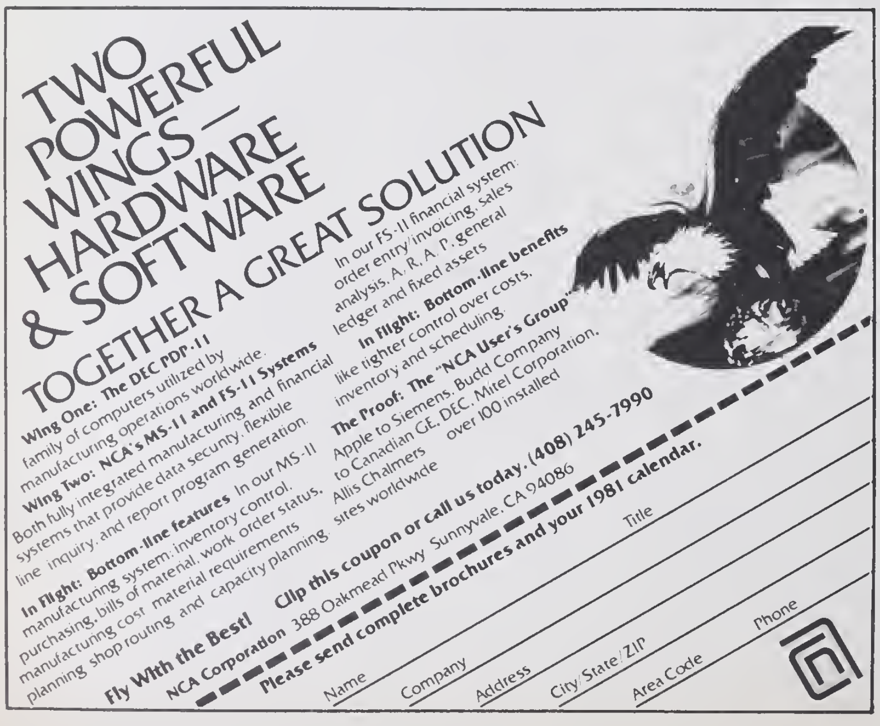
In fact, this situation is probably taking place in spite of IBM plans. VM/370 was not planned, until recently, as one of IBM's future operating environments. Pressure from users made IBM change its position. Although VM/370 is more popular with users of mid-sized machines such as the 370/148, 158 and 3031, the system is for both OS and DOS users.

A sizable portion of 370/148, -158, 3031 and 4341 users operate DOS machines, and VM/370 is a relatively secondary system to the larger OS users. However, a number of multi-CPU or simply larger computer sites run both OS and DOS. These sites represent less than 10% of the total OS population, but their number should increase. Part of the reason for this increase will be the availability of VM/370.

In the past, users upgrading to larger CPUs and migrating from a DOS to an OS environment had to convert their applications from one operating system to the other. With VM/370, users can develop new applications in the OS environment, but do not need to rewrite older applications that can continue to run in the DOS environment for which they were originally developed.

Distributed processing also may promote the use of VM/370. Networks made up of 4331s at distributed sites with larger machines at the central site typically will have DOS/VSE applications running on the 4331 and OS applications on the larger central CPU and may have the need to swap and run applications or pieces of applications in both the DOS/VSE and the OS environment.

Eventually, MVS, VS1, VM/370 and possibly DOS/VS/VSE will evolve to a common environment. This new op-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erating environment will provide such things as a common job control language, common interprocessor interfaces, a common storage management facility and a common system control and management facility.

A very important factor in the implementation of IBM's software strategy will be the use of microcode. IBM will move in the direction of function-oriented processors microcoded to accomplish specific tasks efficiently. This usage of microcoded processors could affect every facet of system software on future medium-to-large IBM machines.

In this scheme, the processing of data itself, file access and other similar operations that today are performed in sequence in the CPU will instead be performed in parallel in logically separated processors, each with its own specialized intelligence. It is reasonable to envision such logical units as a file processor, a programming language processor, a system hierarchy and schedule manager and so on.

### Data System Strategy

With the term "data system strategy," IBM identifies a series of strategies centered around data base management software that includes DBMS, data dictionary, data communications and application development software as well as distributed processing. New releases of such systems as CIS, IMS, DMS and ADF all show clearly IBM's intent to bring these products together and integrate them in a common strategy.

IMS, the current IBM data base management product, is a system that because of its hierarchical data structure approach is, from a performance point of view, better suited for production-oriented applications. IBM, however, strongly believes that end-user applications will be the biggest impact in DP in the '80s.

A relational DBMS, because of its approach to the data structure better satisfies the requirements of end-user applications from a performance point of view. System R, the new IBM DBMS, is relational. Although System R is theoretically a better product for query-type than for production applications, actual performances will determine if this new product can be used satisfactorily in all kinds of application systems.

System R is in beta test at a few IBM customer sites, and early indications, according to IBM, are that System R can be considered successful in its attempt to satisfy both query and production requirements. If this is true, and if IBM can sell its own users, System R will eventually replace IMS and possibly reverse the trend that shows independent DBMS growing at a faster pace than IBM's. On the other end, IMS and System R could coexist, although this does not seem very acceptable from a user point of view because of the need for supporting a dual standard, duplicated system programming expertise and sustaining a doubled software cost.

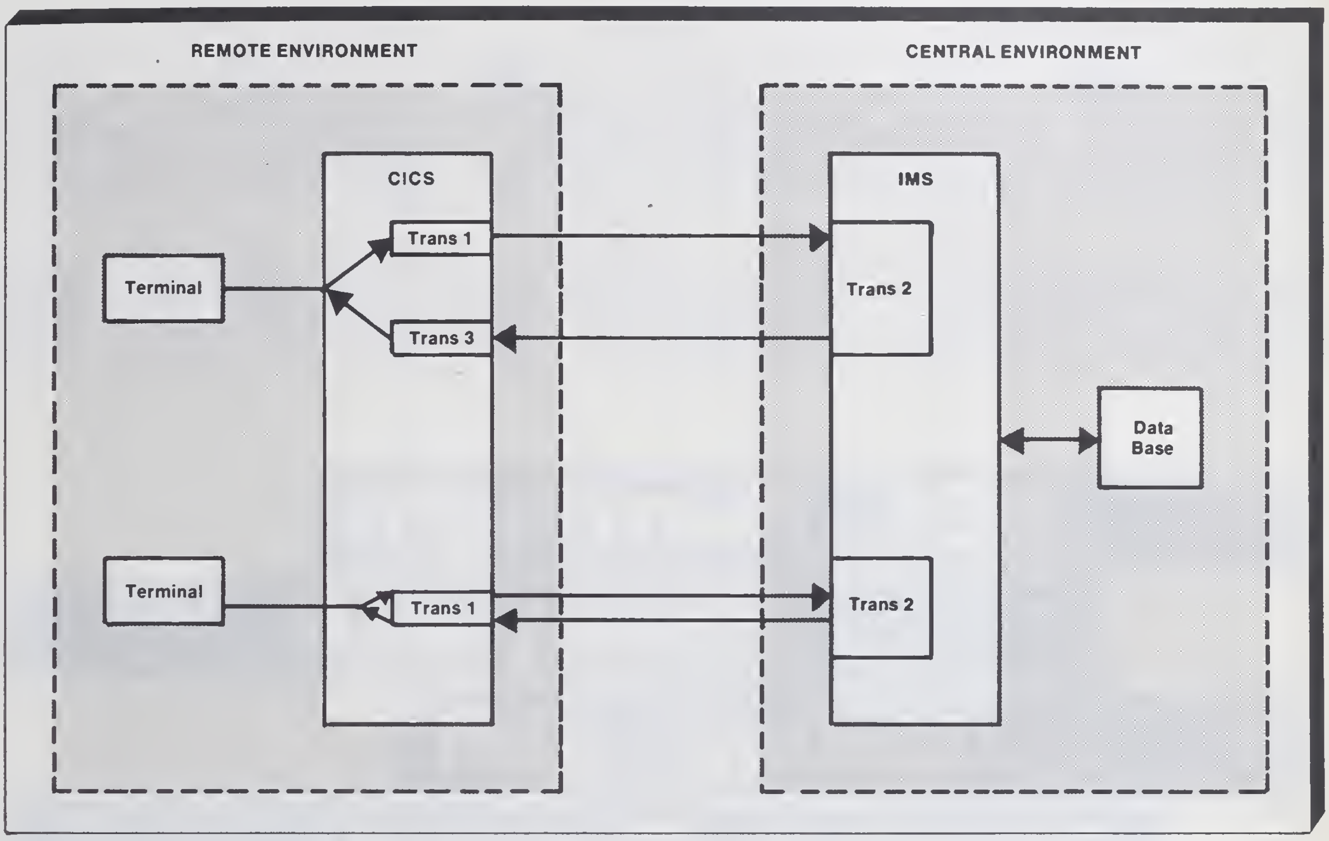

Figure 4. Examples of CICS-IMS Partnership in Distributed Processing.

No matter which way IBM elects to go (IMS, System R or both), DL/1 applications will be protected. IBM commitment to DL/1 has been strongly stressed. IBM must protect the interests of a very large base of DL/1 users. Although the physical data structure may change, DL/1 code will continue to run.

### Changeover Prospects

If System R replaces IMS, this certainly will not occur either rapidly or in the very near future. At those sites using IMS or an independent DBMS, applications have already been implemented that cannot be readily moved to a new DBMS. IBM most certainly will provide aids to facilitate the conversion from IMS-based to System R applications, but it is very unlikely that IBM will offer similar tools for converting applications based on an independent DBMS to System R.

The strategies for data communications software and distributed processing are strictly interconnected in IBM's data system view of application trends. CICS and IMS-DC are functionally equivalent and IBM leaves to the user the choice of the system that best matches the application requirements.

This is particularly obvious in the case of distributed processing applications. In IBM's view, there are three basic approaches to on-line distributed data processing:

(a) The transaction is sent for processing to the data location. This is the simplest approach and the way IMS-DC does it today.

(b) The data is brought to the local site for processing. This is the most complex approach and the way CICS operates.

(c) The data is replicated at the central site and in total or significant subsets at the remote locations. While this is the most challenging approach, it is also the most promising and appears to be the most successful so far, although it raises many concerns such as bulk data transmission and synchronization of data base updates.

Meanwhile, IBM is drawing IMS and CICS ever closer together. The most recent releases of both IMS and CICS contain enhancements that make communications possible between IMS and CICS applications.

With Release 1.6 of IMS, a new function called Intra-System Communications (ISC) has been made available. ISC enhances the programming and processing of IMS-to-IMS application communications and allows for communications between IMS applications and other systems, CICS in particular.

This application-to-application interface will be very important in distributed networks with a central IMS environment and remote CICS, 4300-type environments.

Figure 4 illustrates two situations of IMS and CICS communications that are possible with ISC.

As mentioned before, IBM strongly promotes the concept of controlling distributed processing through data base and data dictionary software. The data dictionary in particular will have an active role and will evolve to become the central point of the system.

### Application Development Strategy

Application development and generation aids are the most important iden-

(Continued on In Depth/14)

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*(Continued from In Depth/13)*

tified software industry requirement and programming trend. IBM recognizes this fact and is including this type of software in its data system strategy. Application development software comprises development systems, report writers, query systems and canned application programs.

The need for these aids stems from the well-known fact that hardware improvements have been orders of magnitude ahead of the ability to develop and maintain applications.

It is very unlikely that IBM will offer report writers and canned application programs as part of its line of application development/generation aids. IBM well knows that the markets for those two kinds of products are highly penetrated by independent vendors with very good reputations. IBM will offer query systems for end-user applications and development systems for professional application programmers.

At present, the only IBM offering in the end-user applications market is Query by Example (QBE). This product received a large amount of publicity because of its graphic approach to query input. QBE, however, is not a strategic product. It works only under VM/CMS, an environment relatively uncommon at larger IMS computer sites where there is higher demand for this kind of product. In addition, QBE raises control problems stemming from its ability to update records.

IBM is in the process of surveying customers to develop the functional specifications for a query product. Because of its end-user appeal, a graphic approach to query input may be used in this future IBM product. However, this would be the only contribution of QBE to such a product. Its features and capabilities will be dictated by user requirements.

Similarly, user requirements are directing IBM's development effort in the area of products for the professional programmer. IBM believes that the future of application programming is in systems that eliminate the need for procedural code.

Professional application programmers should be concerned only with the definition of inputs and outputs. What happens in between is repetitive processing that can be standardized, preprogrammed and made available to the programmer in the form of selectable modules.

Current IBM offerings for the application programmer are DMS and ADF. DMS is a product for implementing on-line transaction applications that run under CICS. ADF is a system for developing IMS applications.

Both DMS and ADF are tools for online applications. For batch application development, IBM offers GIS, an older product that never became popular. IBM is neither promoting nor strongly supporting GIS. The firm understands that future application requirements will be for on-line systems and is enhancing DMS and ADF.

The elimination of procedural code is many years away, but IBM is strongly committed to DMS and ADF, and users will continue to see improvements in these products as well as possibly more of these kinds of systems.

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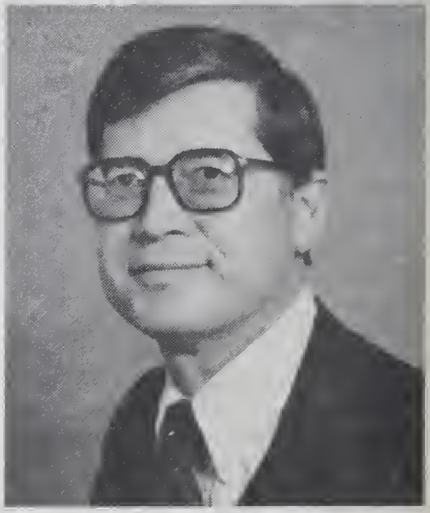

*Michael Amadio is with Litton Energy Control Systems in Chatsworth, Calif., where he is responsible for the planning of microcomputer-based products.*

*Amadio has 18 years' experience in data processing with Olivetti, General Electric, Xerox and Informatics. He has written two books and holds a doctorate in naval and mechanical engineering from the University of Genoa, Italy.*

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# Protecting Corporate Data With Off-Site Vault Storage

BY JOHN P. MURRAY

As data processing evolved from the era of tabulating, punched-card processing to the use of computers, an interesting phenomenon took place. It became clear that organizations with a heavy reliance on these DP functions were vulnerable to loss of data. It became apparent that if a major disruption were to occur and the data files were destroyed, the organization would find itself in perilous — sometimes fatal — difficulty. While the potential vulnerability was clearly as severe as the era of punched cards, little, if any, attention had been paid to this question.

At least part of the reason for this lack of attention was the difficult logistical problems posed by the requirement to move, store and, if required, retrieve and reprocess the punched cards. It is equally likely that the use of punched-card processing did not represent as pervasive a factor as the current use of data processing.

In any event, it has become increasingly apparent that with the ease of storing massive amounts of data either on magnetic tape or disk and with the increasing organizational impact of the processing carried on in the data center, the data must be saved and protected. The ability to reconstruct processing cycles, to back up and to protect the organization's base of data, its informational resource, has become of paramount importance.

### Often Neglected

While data center operations managers generally feel that the off-site storage of backup data files is not only desirable but necessary, often this concept is honored more in the breach than in fact. In many data centers, insufficient attention is being focused on this question. Some data centers do not have any procedure for storing their backup files off-site. Some centers, while they may have the appropriate procedures in place, do not actively follow them.

Some operations managers openly question the requirement to devote time and effort to this subject. They adopt the same attitude that many adopt when considering the question of contingency planning; that is, "It always happens to the other fellow. Why should we worry?"

This attitude is somewhat more prevalent in small data centers. It may reflect a lower degree of overall DP sophistication and also a DP involvement on an organizational level that is not perceived as being as pervasive as that of a medium-sized or large operation. The individual directly responsible for the data center operation within an organization must be aware of the absolute requirement for a comprehensive off-site valut storage plan. This plan must be in place and used regardless of the size of the particular organization!

The requirement for adequate, controlled off-site storage of critical data files should be apparent. No one can argue successfully against the need for this protection. Any organization, regardless of size, that depends upon DP for its operation simply cannot risk the chance that historical files may be required and then found to be unavailable. Because of its inherently volatile, dynamic environment, even the most competently managed data center will, from time to time, find itself subject to unforeseen difficulties. A failure to properly protect the historical files is simply a case of dereliction on the part of the operations manager.

Another aspect of the protection and availability of historical files should also be of interest to the manager. While he may not have explicit control of, or responsibility for, the word processing function within his organization, the data center operations manager should make sure those who do have this responsibility are aware of the requirement for adequate backup of the word processing data and that appropriate steps have been taken to secure that information.

### Part of Routine

It should be noted that the time and effort required to plan, implement and maintain a sound, viable off-site vault storage protection procedure should not be great. Once it is in place and operating properly, the effort becomes routine. The total amount of time and money expended upon the question of off-site storage should be miniscule in the context of the overall data center effort and budget. If this is not the case, the manager should review his approach to determine why the cost is high.

Any number of rather common occurrences can, in the absence of adequate off-site storage, pose serious consequences, even to the extent of disaster for the entire organization.

What are some of the more common situations which would, in the absence of adequate backup, be likely to produce an organizational disaster?

- The failure, either accidental or intentional, to remove tape file protect rings which would cause these tapes to be written over when the information should have been retained.
- Incorrect external labeling of tape files or the removal of external tape file labels.
- Scratching of tape files.

Any of these situations might be caused by accident or might occur through the malicious acts of disgruntled employees. These instances can be mitigated to a great extent through the use of a tape library software control system. Following are some other possibilities:

- Incorrect or incomplete processing runs destroy tape or disk files.
- Equipment malfunctions, such as tape drive failures or disk drive head crashes, destroy data files.
- A disaster such as a fire or flood in the data center destroys files.
- Civil unrest or strikes either cause files to be destroyed or bar the organization's employees from access to the data center.

Again, the response to these circumstances may be something along the lines of, "We have been in operation for 20 years and nothing like that has ever happened to us, so why should we worry?"

Every data center that uses tape processing has had some kind of problem with files that have been destroyed. Even if the operation has been lucky, the manager must not adopt a cavalier attitude toward this approach. There is merit in the argument that the possibility of serious difficulties is, in the context of total data center operations, rather slight. But there is also a great deal of merit in the argument that both the exposure and the magnitude of po-

(Continued on In Depth/18)

> *It has become increasingly apparent . . . that data must be saved and protected.*
>
> *The necessity, indeed the absolute requirement, to maintain the ability to reconstruct processing cycles, to back up and protect the organization's base of data — its informational resource — has become of paramount importance.*

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*(Continued from In Depth/15)*

tential disaster associated with these situations is rising.

The salient consideration with regard to the question of the need for an adequate off-site vault storage program must be that in those installations where such situations have occurred, the damage has often been extensive. In some instances, the damage has been so complete as to put the organization out of business.

The manager should view the operation of an off-site vault storage program as a form of insurance. He pays a small premium — the time and effort required to transfer and control the files — in the hope he will never have to collect on the investment. If he does need to collect, the manager will be very thankful he has his insurance (the backup file) in good order. At this point, any investment will be seen as minor. A simple risk analysis of the dangers, the potential liability posed by the lack of attention to this question, measured against its cost, will quickly demonstrate the requirement to go ahead with the process.

It is clear that no data center operations manager or, in the case of a small installation, the particular person charged with the overall operational responsibility, can afford to ignore the question of adequate off-site protection of data files. The analogy to insurance again applies — that is, the existence of redundant files at some other location simply spreads the organization's risk. It can be stated with complete certainty that adequate off-site vault storage represents a sound data center insurance plan which will benefit the entire organization.

### Basis of Sound Plan

There are two aspects to the implementation of a sound, effective off-site vault storage plan. The first is, of course, the site itself. The second concerns the procedures used to assure that the files stored off-site are the appropriate ones and that they are properly controlled.

In considering the characteristics of the physical site, the manager must be aware of these mandatory factors for a well-designed facility:

- The storage location must be truly "off-site." Storage in some other part of the building that houses the data center does not constitute appropriate storage. Storage in a different building in the same complex as the one in which the data center is located, or in a building adjacent to the complex, should be avoided. Off-site must mean off-site! This storage facility must be far enough away from the data center so that a disaster will not endanger the backup files.
- The backup storage site must be secure. Access to the area where these files are stored must be available only to authorized persons.
- The backup files, be they tape or disk, must be stored in a vault or safe that will protect them not only from the possibilities of malicious mischief, but also from fire and flood. The vault should also be located in an area protected from extremes in temperature and humidity.
- The off-site location must be set up so that members of the data center have access to the vault 24 hours a day, seven days a week. It would be rather unfortunate to find a need for a backup file at 3 a.m. Saturday and then find the file cannot be obtained until the next Monday morning.

Several methods can be employed to provide adequate off-site storage. Perhaps the most desirable, in terms of availability and control, is the utilization of a company-owned location (a suitable distance from the data center) that will allow for the exchange of files on a daily basis. An almost ideal situation exists in those organizations where company locations are served on a regular basis by a courier service. It should not, in these curcumstances, be too difficult to set up an automatic file retention system.

Data centers may join in mutual agreements in order to store and secure each other's files. This can be an effective method, provided the files are adequately protected. In these situations, personnel at the data center storing the backup files must not be allowed to gain access to the other data center files. This is an important consideration for two reasons:

- There is always the possibility the backup files will, for whatever reason, be written over and destroyed by personnel at the storage location.
- More important, an organization's

information base might be stolen by a competitor or perhaps be held for ransom.

In addition to the convenience implicit in the mutual sharing arrangement between data centers, there is another benefit. The data center operations managers' efforts to build and maintain the off-site plans will strengthen their cooperation and should, in the long run, help them develop working relationships that can be used in other areas of data center management.

While there is merit in considering the use of a cooperative plan between data centers, the more appropriate approach, if available, is to use the services of a commercial firm that specializes in offering off-site vault storage protection. As an example, a local bank might be contacted.

### Underground Facilities

As the awareness of the need for appropriate off-site storage facilities broadens, the range of options also broadens. One of these options is to make use of one of the services designed specifically to provide off-site vault storage protection. Several firms have made use of caves or mines and now offer underground storage facilities.

These facilities do offer some inherent advantage; they can be secured, controlled access can be maintained with little difficulty and the problems of excessive heat and humidity are overcome. Some of the firms that offer this service are Underground Vaults and Storage, Inc., Hutchinson, Kan.; Western States Underground Storage Vaults, San Jose, Calif.; Iron Mountain Security Storage Corp., Hudson, N.Y.; and Southern Vital Records, Flora, Miss.

It is reasonable to assume that as the need for storage of vital computer records grows, more organizations will be formed to offer these services. Obviously, as this occurs, the data center operations manager will have less trouble meeting his requirements in this area.

Assuming the requirement for an appropriate off-site location has been met, what else must be done in order to ensure a sound off-site storage program? It is unfortunate, yet all too often the case, that once the storage arrangements have been finalized, the manager leaves to chance much of the remaining work, which centers around the questions of the actual storage and control of the files at the off-site location. Some managers seem to feel that simply having made the arrangements is enough to provide adequate protection.

The operations manager has a clear and absolute responsibility to see to it that a comprehensive off-site storage plan is developed and then used. Once in place, the plan must be carefully followed. To allow anything less than full compliance is to be remiss.

If the plan is not adhered to, sooner or later difficulties (difficulties which senior management will have assumed were anticipated and guarded against) will arise. When this occurs, the manager cannot use the existence of the plan as a defense. The fact that the plan was in place but not followed may in the end be a stronger indication of the culpability of the manager than if no plan had been put together.

As the details of the physical arrangements are being worked out, the manager must begin to turn his attention to the structure and ongoing operation of the off-site vault storage plan. It is essential that this planning not be carried out in a vacuum. The person or persons who will have responsibility for the day-to-day operation of the plan must be brought in to help with the design. In larger data centers, this person would probably be the tape librarian; in small installations, the person responsible might be the computer operator or the data control clerk. The manager must make certain that whomever is assigned responsibility for the control of the files fully appreciates the importance of that responsibility, not only in its impact on the data center, but on the entire organization.

### Which Files, How Long?

Consideration of the plan will very quickly bring to light a major concern: What files should be stored off-site and for how long? The appropriate place to begin this consideration is with the retention cycles of the plan

*(Continued on In Depth/20)*

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currently in effect, if such a plan is being used. Some considerations are:

- Is a cyclical rotation — father-son-grandfather — plan being used? If the current file and copies of the two preceding generations are not being maintained, this must be done at once!
- Are critical disk files backed to tape on a regular periodic basis?
- Is a formal retention schedule in effect?
- If a formal schedule is in place, is it being followed?
- Are periodic reviews made of the backup files to assure their appropriateness?

If a review of the current backup procedures indicates the preceding steps are not being followed, the data center operations manager must act to see that these items are in place and working.

It is not unusual to find, even in data centers where an off-site storage plan is in effect, that both the quantity and quality of the files stored off-site leave a great deal to be desired. Again, the manager must not allow himself to be lulled into complacency by the mere existence of an off-site facility or a written plan.

Once realistic backup procedures have been established and are operating correctly, the question of which specific files are to be stored off-site must be addressed. A balance must be struck here between the selection of files that are critical to the continuing operation of the data center (and ultimately to the organization) and the tendency to "wear a belt and suspenders" and save "everything, forever." Each organization must answer these questions based upon its empirical and perceived needs. However, while some guesswork will be necessary in these evaluations, the manager should take the approach that should he err, it will be better to err in saving too much rather than too little.

### Master Control

These backup file questions of what, how much and how long must be given careful consideration. The employee charged with the responsibility for the operation of the off-site storage plan must provide a mechanism to ensure that the correct files are stored off-site, and that they are held for an appropriate length of time, but not any longer than necessary. These files must be appropriately rotated.

One method for providing this control is the use of a master control list of the backup files that are stored off-site. In those installations where automatic tape library software is used (any data center with more than 1,000 tape files should have such a system installed), the master control can be generated by the software. In data centers that rely on a manual tape control system, the master control list will have to be maintained by hand. In either case, it is of prime importance that a master list be used and that it be accurately maintained.

Most important when considering retention cycles and the specific files to be saved is that the person responsible for the system be absolutely certain which files are being saved and that those files will fully protect the organization in the event of a difficulty, regardless of its magnitude.

The concerns with regard to the number and the length of retention cycles come down to two questions:

- What processing cycles are considered to be of sufficient importance that the ability to rerun those systems must always be available?
- How many processing cycles must the data center be prepared to rerun in order to ensure the recreation of those files?

### First Consideration

Often the first serious consideration of the question of off-site storage comes about when a situation causes the data center operations manager, and often senior management, to become aware of the potential danger in not having a plan. When it becomes clear that lost or destroyed files cannot be reproduced or that the files can be reproduced, but only at great cost in terms of not only money but also time, everyone's awareness of the problem is heightened.

Indeed, this awareness may not result from such an occurrence as the loss of data; perhaps the issue will be brought up by an astute user. The specter of the current backup system's inadequacy may be raised by any of a num-

*(Continued on In Depth/22)*

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*(Continued from In Depth/20)*

ber of parties: auditors, customers, senior management, vendors and so on. The issue may be raised by some difficulty in some other installation.

Regardless of the cause, once the issue is broached, the usual approach is to overreact. The tendency is to attempt to save too much, to move so as to cover every eventuality, no matter how insignificant. At this juncture, the manager must exercise care in order to give the subject appropriate, yet not excessive, consideration. A rational approach must be taken to determine what really needs to be saved and for how long.

The dichotomy between the user and data center operations manager comes into play here. Users — both the members of departments who use the services of the data center and the members of the systems and programming group (who are often the largest single group of data center users) — will always push to save what, when carefully analyzed, are excessive amounts of backup. Why not? If the users can get the manager to agree, they will have complete protection for their files and they will have greatly reduced their potential exposure. Because the expense of this complete backup, the "save-everything-forever" approach, is not a user expense, it is very attractive for the users.

This "belt-and-suspenders" approach must be resisted. While it may well be that data storage on tape files is rather inexpensive and that the cost of the physical space to store the tapes can be rather easily justified, management costs must be considered. No data center has excess resources; the need to handle and track large amounts of backup tapes if they are really not needed should be done away with.

A "reasonableness" factor must be considered. Systems should be reviewed on a risk analysis bases. Each system must be analyzed to determine its importance to the organization. Not all the information processed by the data center would be absolutely required in the event of difficulty. The work and expense associated with the reconstruction of files must be balanced against their true value.

As this analysis goes forward, it will become clear that with appropriate planning, some of the files that were believed to be needed will not be required. The decision may be that the organization can live without that information, or it may be that alternative methods such as keying information from paper files might be used if really necessary.

The point of this analysis is not to attempt to save expenses — the cost of the backup will not be great in most cases — but to examine the backup, retention and rotation plans to determine through this testing if they are valid. Why maintain anything that is not required?

### Standard Criteria

While the data center operations manager will want to set up the plan for the backup procedures based upon the given requirements of his particular organization, there are some "standard" criteria which should be kept in mind:

- What impact would the total loss of this particular set of data have on the organization?
- If necessary, could the information be reproduced from some other source? At what cost? How long would the process take?
- Does the expense connected with backing up this data justify its retention?
- Are there specific regulatory or organizational constraints that mandate the complete retention of this data regardless of cost? Is this backup mandatory?
- Do the department managers understand and concur with the impact and retention conclusions?
- Has an appropriate member of senior management been given the opportunity to review the retention schedules?

### Retention Cycles

When the files which must be retained have been identified, the second question, that of the length of time and number of cycles for which the files must be retained, should be addressed. This decision cannot be made arbitrarily by the operations manager. The department managers responsible for the work being produced by the particular systems must be given a strong voice

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in the resolution of these questions. While the "save-everything-forever" syndrome must be avoided, the retention cycles finally set must be realistic.

Consideration of the number and length of retention cycles raises two issues:

- What length of time (number of processing cycles) constitutes adequate backup in the event of the requirement to reconstruct files? Analysis must be done here; for most systems, three cycles, the current and the last two, are adequate. There may be cases, however, where five or six cycles are required.

The three-cycle father-son-grandfather retention should be considered the minimum and, in most cases, the appropriate schedule. However, the data center operations manager must be aware that it may not always be sufficient, and he must work with the users to cover this aspect.

- Will the reprocessing of the cycles satisfy the users? There may be special inputs to the processing which, if not included in the reruns, will not produce the complete reconstruction. Again, working with the users prior to finalizing the retention cycles will help highlight these areas of potential difficulty.

Once the systems have been identified, use of the standard father-son-grandfather retention system will suffice to meet most of the anticipated needs of the organization should a problem arise. This presupposes, of course, that the grandfather files are securely stored off-site and that the rotation procedures are being followed so as to ensure the appropriate files will be available if needed.

It may be the case, in some unique instances, that more than the normal caution will be required. As an example, it may be a regulatory requirement that a seven-year history be maintained. If this is the case, obviously the standard father-son-grandfather retention will not be appropriate.

The data center operations manager must make certain these "nonstandard" instances are managed and that they are not simply handled as routine with the result that the required backup is destroyed. Again, the use of an automatic tape library system where the retentions can be controlled through the computer will provide extra security in this area.

### Periodic Reviews

Once the system has been implemented and appears to be operating correctly, the manager will want to give consideration to the review of the process on a periodic basis to make certain it is being handled correctly. This is a very straightforward, even simple, task. The manager should assign someone in the data center other than the person responsible for the backup files the responsibility for conducting periodic reviews of the adequacy of the files stored off-site.

The machanics of this review need not be elaborate. Using the off-site storage control listing, the employee conducting the review will visit the off-site vault storage location and verify the files stored there against the master listing. While this review should be done periodically, it should be done irregularly.

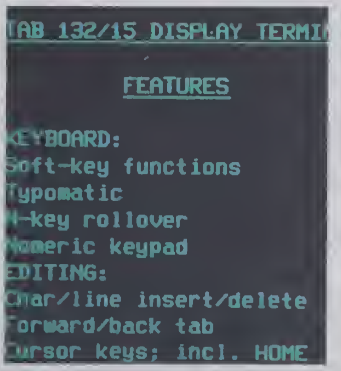
As is the case with any meaningful audit, the element of surprise is important. If the person with responsibility for the off-site vault storage files has prior notice of the timing of the audit, the effectiveness of these reviews will be diminished.

The concern with the files stored in the off-site vault storage facility is twofold. The files said to be stored there (based upon the master control listing) must actually be there, and the file must indeed contain the information it is supposed to contain. As an example, if tape No. 1282 (March month-end accounts receivable) is shown on the control sheet as being stored at the off-site location, it should be there. In addition to file No. 1282 being at the vault storage location, it must indeed be the March month-end accounts receivable file.

### Look at Contents

In order to ascertain that all is going according to procedure, the data center operations manager should, in addition to reviewing the actual files stored off-site, set up a process to review the content of the tapes on a random basis. This can be accomplished by returning several selected files to the data center

(Continued on In Depth/24)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*(Continued from In Depth/23)*

and using them to recreate the processing cycles they are supposed to back up.

This need not be an elaborate or time-consuming process; the intent is to assure that what is said to be available is indeed available. In most cases, a periodic random sampling will be sufficient. If those files selected and processed are correct, the manager can feel confident the system is being correctly administered.

It is quite possible that this random sampling of the adequacy of the backup files may be carried on as a part of the normal data center operation. If this is the case, no formal plan need be instituted. In many data centers there are sufficient instances of the need to reprocess production cycles on a continuing basis so that the manager can be assured, simply by virtue of the successful completion of those reruns using the backup files, that the off-site vault storage plan is being followed.

The method for testing the adequacy of the backup files is not of particular importance.

The salient factor is that the manager makes sure the procedures are being followed and that the people responsible are aware that their work is being checked.

Those responsible for the backup files must remain aware of the importance of this responsibility; periodic testing of the procedures, no matter how it is carried out, helps reinforce that importance.

### Selling the Idea

While the total expense associated with the development, implementation and ongoing maintenance of an off-site vault storage program is minor, particularly as compared with the total data center budget, the manager may find he has a problem selling the concept to senior management. One of the concerns that may be raised is the perceived loss of control of the data if it is stored off-site. This concern can be allayed if the manager has exercised appropriate judgment in his selection of the off-site facility.

The compelling rationale for the use of off-site storage is simply the absolute requirement to protect the organization in the event of the loss of files within the data center. It is difficult to believe that senior management, once apprised of the consequences of not taking this action, would be willing to oppose the plan.

In some instances, the data center operations manager may have a selling job in order to install the plan, but this effort should be minor.

### Real Risks

As a practical matter, the manager must remain cognizant of the real risks in a poorly administered off-site vault storage program. The "going out of business" scenario is real. Organizations have suffered the loss of files, been unable to reconstruct the data and have been forced to stop doing business. Even those organizations that have, through luck, been able to survive a disaster without a solid off-site vault storage plan have faced severe hardships in maintaining their business.

On a somewhat less intense scale, the loss of records will cast the organization in a poor light with respect to its customers; this must also be a matter of concern for the manager. Loss of business and customer goodwill cannot be treated lightly.

There can be instances where the loss of information, in terms of the overall organization, has a rather minor effect, yet the ramifications in terms of the organization's image may be quite severe.

The scope and complexity of the off-site vault storage effort is minor; it is really a clerical function. It does not contain much glamour or excitement, the effort is routine or even mundane and there are no rewards for a job well done unless a disaster occurs. However, the need for an effective plan is critical.

The data center operations manager has the clear responsibility for seeing that an effective plan is in operation, and he must do whatever is necessary to accomplish this.

---

*John P. Murray is director of management information systems (MIS) at Ray-O-Vac Corp., Madison, Wis.*

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# How to Navigate The User Fog

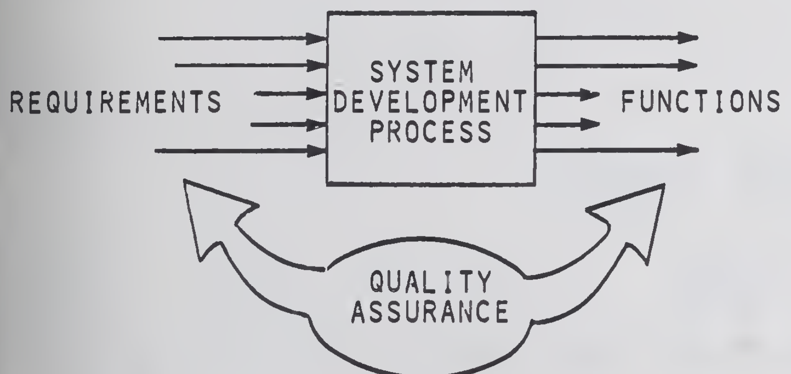

Figure 1. The Software Engineering World

What is *maintenance*? What is *system requirements definition*? When you use those terms, do they mean the same thing as in the articles you read? I think not.

There are four very different worlds, and these terms have different meanings in each of these worlds. There is the vendor world, the mil-spec world, the computer science world and, you guessed it, the *real* world! The inhabitants of each of these worlds view the requirements process differently and use these terms to suit their view.

### The Vendor World

Hardware manufacturers live in a world of their own. I am most familiar with IBM, so I will describe the vendor world in terms of IBM and its user groups. IBM hears user requirements from Share, Guide and Common. These groups are segregated by machine size and interest so this automatically groups these requirements into some functional areas, such as "large system users," "large commercial users," "small system users" and so on.

Each of the user groups, in turn, has special interest divisions which address specific problem areas. These divisions generate "requirements" which are delivered to IBM in a formal way. IBM is expected to specifically address these requirements in a positive ("yes, we'll do that one") or negative ("not at this time") way. IBM cooperates actively in this process for a number of reasons.

First, it is a way of fostering customer satisfaction. Second, it provides IBM with a natural marketing tool . . . the

(Continued on In Depth/26)

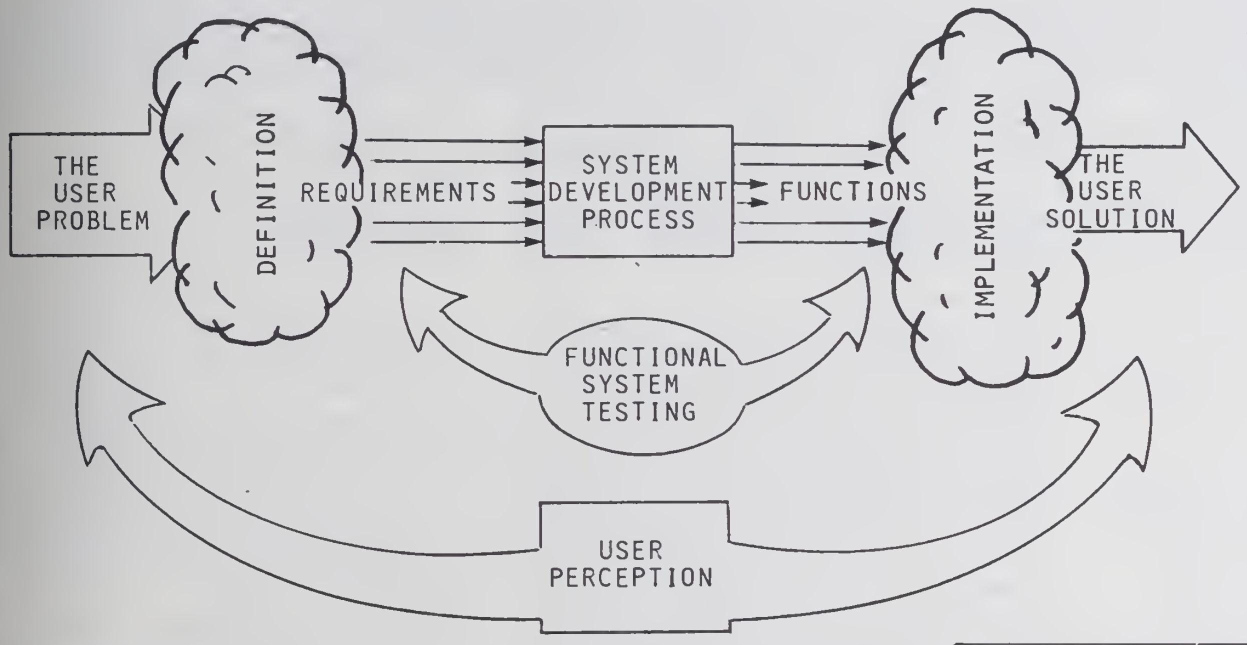

Figure 2. The Real World

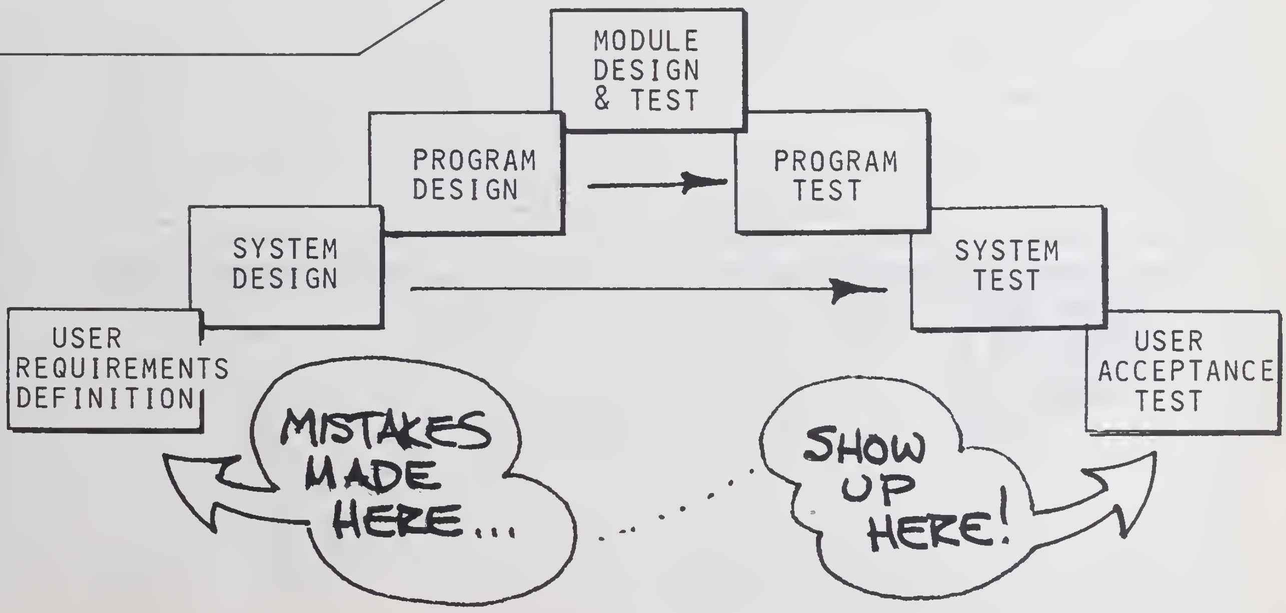

Figure 3. Freeman's Inverse Law[2]: "Early mistakes are discovered later."

(Continued from In Depth/25)

users are actually qualifying themselves as potential customers for the products IBM builds. Finally, although the customers are asking for what they need *now*, the communications process helps IBM figure out just where the market is going (or where they want it to go).

These formal requirements are usually stated in terms of functions. IBM groups these functions together, studies them, notices the generic similarities and differences and derives a set of generalized functional requirements for a package. These requirements are put into the software/hardware development process and ultimately result in a product announcement of a system that meets those requirements.

Typically, the system has a great many functions (to IBM, "good" and "lots of functions" are synonymous) which surely include the functions requested by the user. The IBM software development legions measure their effectiveness in terms of how well the functions of the finished product match the functional requirements, as shown in Figure 1.

### The Mil-Spec World

This world is bounded by standards derived by the customers, the system builders and a third group, the documenters. Presumably, the customer knows what he wants, the system builder knows how to build it and the documenter knows how to write it all down. These three groups participate in the following version of the requirements definition process.

1. The user produces a functional requirements document in the form of a request for proposal (RFP). This RFP may be produced directly by the user, or he may have a group of documenters rewrite it so that it contains "shall" and "will" in all the right places. The RFP, if properly written, will contain a great many requirements which may be categorized as *functions, performance requirements* and *constraints*. (In fact, the RPF may not categorize them in this way, but it should.)

2. Each potential system builder takes the RFP, develops an understanding of the requirements and an approach to building a system which meets those requirements. Then, some documenters rewrite everything so that it looks the way a proposal should.

3. The user selects a system builder, based on how likeable its proposal is. After a builder is selected, the user and builder negotiate until they agree on a set of functional requirements and how it will be implemented. The negotiations usually take a fairly short time because everyone wants to get on with the business of building the system. The agreement, suitably manicured by documenters and lawyers, becomes the contract.

4. The builder builds the system according to the contract. When the system is complete, the user and builder compare the functions of the delivered system with the functional requirements in the contract and adjust everything until they match. Within the scope of the contract, the process looks very much like Figure 1. It is usually (perhaps euphemistically) called "software engineering"[1]. This elegant title helps to justify the cost, which must be high in order to pay for the documenters!

### The Computer Science World

It goes without saying that the computer science world is at least a step (probably a lot of steps) away from reality. You doubt that? It took the computer scientists 15 years to get around to seriously addressing the "operating system problem." It was another five years before they seriously began to attack the problem of building and accessing large data bases. They considered those problems "trivial."

On the other hand, the systems development environment in the university is totally unreal. There are several good reasons why.

First, the system to be developed is either imaginary or represents a fairly trivial piece of the university information flow. Typical systems include library management, bookstore accounting and budget forecasting and allocation. Such systems hardly approach the complexity of a typical manufacturing control or corporate management information system.

Second, the workers are students — smart, but green. Consequently, the

(Continued on In Depth/28)

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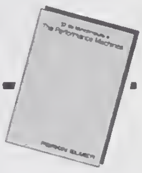

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(Continued from In Depth/26)

system must be simple enough for young students to understand and small enough to be completed by a limited number of students in a fairly short period of time (like a semester). If the project is a long one, it won't be completed by the same development team.

This problem of changing personnel is a very serious management challenge. Such a challenge is not easily met by most university computer scientists. The computer scientist who is that good at managing doesn't stay in the university environment — he can make three times as much money in one of the other worlds I am describing.

### The Real World

The real world is populated by data processors coping with the whims and vagaries of their users. A typical user has a serious business problem that must be translated into a set of functional requirements. Next, those requirements must be incorporated into a system that performs those functions. Finally, the system must be installed and modified to solve the user's business problem.

Figure 2 illustrates the process. This diagram explains a number of difficulties that DP people encounter, both with users and within their own organization.

Functional testing, as shown, may do a good job of testing the fit of functions to functional requirements, but it does nothing to ensure that the user's problem is being solved by the system. The system the user gets may be exactly what he asked for, but it may not solve his problem at all. If it does not, he has every reason to be dissatisfied.

If the system is built by an outside consulting firm, it may fulfill the terms of the contract and still not satisfy the user. In the internal DP organization, there is no real contract. The DP staff has been chartered with the task of *solving the user's problem.* If the requirements spec is off, they have to make it up at the end of the life cycle, during installation.

Notice that cloud on the back, marked "installation." It represents the adjustment of the system's functions to provide a real solution to the problems of the user. Much of the work done getting through that cloud gets labeled "maintenance." We navigate that cloud in fire-fighting mode, making unplanned and unmanaged changes, missing deadlines, overrunning schedules and generally looking incompetent. Why is that? You know! That implementation cloud is the direct result of our failures on the front end of the process.

This brings us to that cloud labeled "definition." I like to call that cloud "the user fog." I call it that not because the user and system builder are both in a fog (they are), but because it is navigated only with the greatest difficulty. The way is strait and fraught with potential mistakes. There are no directions, signposts or maps to guide the way. Worse yet, every mistake made in crossing the user fog causes multiple problems during installation.

All of the experts have noticed the phenomenon illustrated by Figure 3. Do you suppose one of them can tell us how to navigate the user fog?

### The Vendor Experts

IBM offers a very popular course called "Managing the Application Development Process"[3] which describes the entire system development process. Let's see if it discusses the user fog . . .

**No, it starts with the functional requirements, rather than the user problem. This is because most of the software development people at IBM are responding to requirements generated by their salesmen and user groups. The only people fighting the user fog at IBM are its own internal DP service groups, and they don't seem to be**

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writing the course material! Let's try some other experts.

### The Software Engineers

In the mil-spec world, the software engineers, like the vendors, rarely have to navigate the user fog. The user does it! Rather, the user analysts who produce the RFP perform the match between the user problem and the initial system requirements. Sometimes it is a good match; sometimes it is very fuzzy, seriously impacted by short deadlines and the necessity to describe a "feasible" system within the specs.

If the RFP writer is to get better at navigating the user fog, he must get some feedback about how good a job he has done. The only way he can know is to wait and watch the transition through the installation fog on the back end. Unfortunately, most mil-spec systems take several hundred person-years to build, across a duration of several years. By the time the system gets that far along, the RFP writer is gone!

Finally, once the contract is signed, guess who gets blamed if anything goes wrong. You got it . . . the system builders! And a software engineer's (valid) complaints about the specs always sound like sour grapes when they're coming from the depths of the installation fog.

### The Computer Scientists

The computer scientists never really come to grips with the user fog. Most of their systems are built for an imaginary user, with a professor or proctor playing the part of the user. The problem can bend and change to fit the requirements! The student never encounters the sophisticated user who doesn't understand computers, but who has 20 years of experience with his own application. Also, because of the turnover resulting from graduation and class length, these fledgling developers don't encounter that angry user who didn't get what he was promised. All in all, everyone in this world stays pretty much in the clear — out of the fog.

"But," you say, "what about all the articles being written by college professors about the requirements definition process?"

An examination of these articles reveals that they are not really dealing with the real-world problem. Most of their statistics and examples have been borrowed from the mil-spec world. Moreover, approaches which use propositional calculus and formal definition languages clearly do not relate to the grassroots user at all (unless he happens to be a mathematics professor).

### Who Understands the Problem?

The people who best understand the problem are the real-world people (like you) who are coping with it very day. Unfortunately, although understanding the problem is essential, it doesn't always lead to a solution. (Knowing you're really lost in the woods is a good first step — better than wandering aimlessly — but it doesn't automatically get you out of the woods.)

Another group of people understands the problem well: the commercial software consultants who grapple with this problem time and time again and pay for failures in hard dollars and failed businesses. The small commercial consulting firm that has survived in the real world for a decade or more has learned to deal with the problem in one way or another. It must have, to have lasted that long!

For the past three years, I have been studying and recording successes and failures in attacking the user fog. I have noted two basic approaches.

### The Ex Post Facto Approach

One way to cope with the problem is to be very, very good at getting through the implementation fog. (Another name for this is "the old soft

*(Continued on In Depth/30)*

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*(Continued from In Depth/29)*

shoe.")

If you have been in the business for any length of time, you have probably done it this way at least once. The approach has led to a number of pseudo-humorous aphorisms such as Fred Brook's admonition to "plan to throw one away."[4] This approach may be part of the ultimate solution, but only if we recognize the total problem and design the entire project with this "throw-one-away" philosophy in mind from the beginning.

Otherwise, we wind up doing the implementation in crisis or fire-fighting mode; in other words, the old soft shoe is done on a hot stove! Unfortunately, everyone, including the user, is liable to get burned.

### A Better Approach

The real difficulty lies with the user fog itself — that fuzzy correspondence between the user's problem and the system requirements. Let's attack that problem directly. There seem to be two options available.

Option 1. Hire an analyst who is a specialist in this application, or train an analyst so that he completely understands the problem. Since he really understands the problem, he can derive a good computer-oriented set of requirements that will satisfy everyone.

Option 2. Train the user in enough general systems concepts that he can navigate the user fog himself.

Option 1 works, but has several difficulties. Have you tried to hire a good systems analyst lately? It's hard enough without narrowing the field with special applications qualifications. If you are training an analyst who is already on board, you find that most applications areas have nuances and subtle problems that take *years* to appreciate and solve. And who has years? Most business problems need to be solved *now*.

Option 2 — training the user — works much better than you might expect. At least one analyst must be assigned to the project to function as a counselor and guide. The definition process must be structured and repeatable, so the analyst understands it and can teach it. Let's look at the process in that light; we need techniques, tools and an overall methodology.

### Techniques

Many of the successful techniques of system definition have been around in bits and pieces for years. These techniques include the following:

The System Survey uses interviewing, document collection and a number of excellent traditional flowcharting techniques, such as document, process and organizationally oriented ($0^2$) flowcharts to graphically portray the physical processes currently extant in the user organization[5,6]. More recently, structured analysis tools such as the data flow diagram[7,8] provide an excellent transition device with which to analyze and define the logical elements in an existing system.

Business Requirements Analysis techniques such as BIAIT[9] and BSP[10] focus on the high-level nature and needs of the business and provide an overall framework for DP goals and system development.

Structured Problem Definition, as described by Kepner & Tregoe[11], offers the working analyst an eminently teachable, step-by-step approach to problem definition. This approach begins with a definition of the expectations of the user and systematically defines the problem as a deviation from those expectations.

Structured Requirements Definition, using Hipo hierarchy charts[12] or Warnier-Orr diagrams[13], imposes a hierarchical structure on the requirements, as they are derived from a continuous dialogue with the user. This structure, containing the functions the user is performing in his current system, provides a common meeting ground for user and developer throughout the entire system development effort.

### Tools

During this first phase of system development, we're trying to build a very high-level, abstract view of the system in user terms. Abstract, but complete and correct at this level. It's a tough job; to do it right, we need some good tools.

What tools are presently available?

*(Continued on In Depth/32)*

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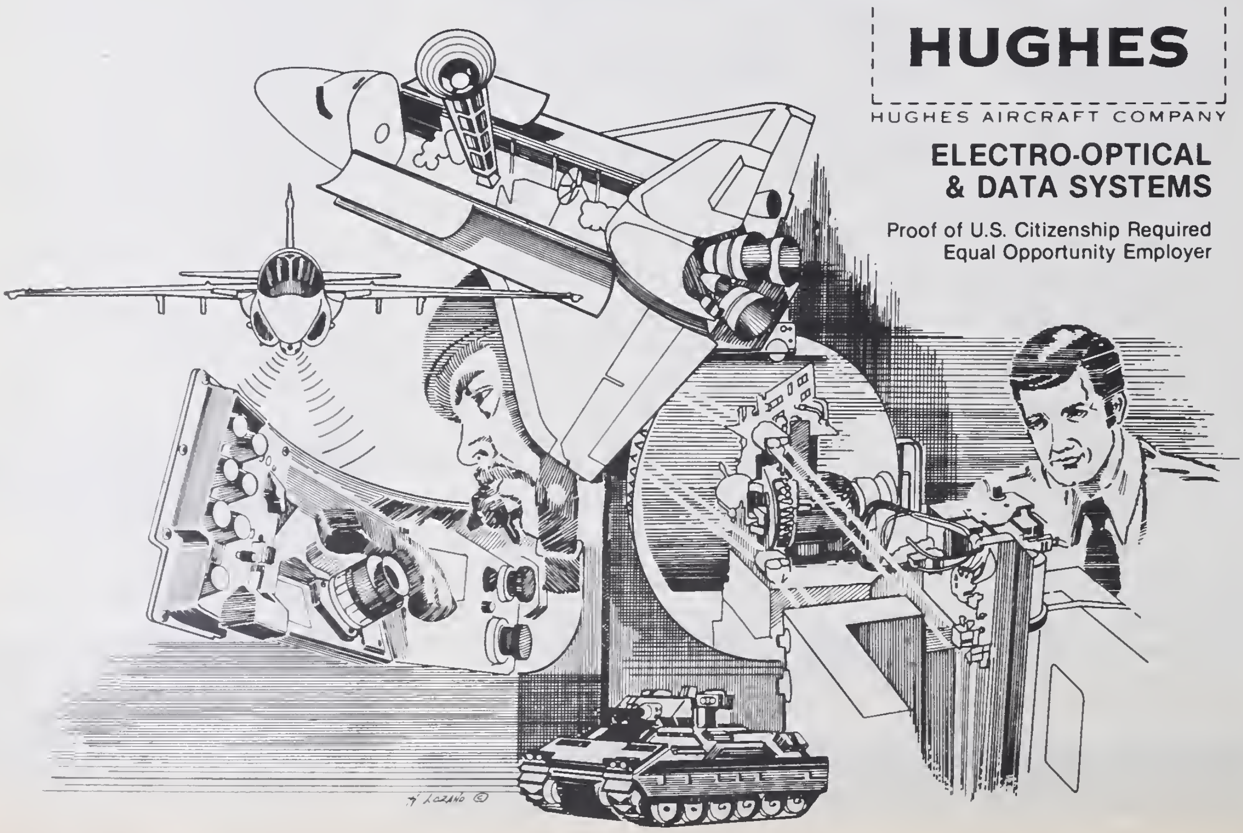

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*(Continued from In Depth/30)*

Traditionally, our chief tool has been the pencil. Most of our other tools are simple extensions of that. The decision table and decision tree are good examples.

Recently, we have discovered more sophisticated graphic tools, which allow us to effectively express our ideas and communicate them to the user. The best known of these are data flow diagrams, Warnier-Orr diagrams and hierarchy charts. There are a number of other proprietary graphic tools, the best known being the graphic language associated with Softech's SADT. All of these, however, are essentially *hand tools.* Using such primitive tools is like trying to build a rifle with a file and a hand drill; it's possible, but really tough.

### Toward Automation

At the other end of the spectrum, there have been several movements afoot over the last decade to totally automate the requirements generation process. Representative efforts include ISDOS (PSL/PSA), Gypsy and SREM[2]. These projects are undoubtedly useful as research vehicles, but I don't think they really attack the user fog.

We don't even know how to do the job manually and we're trying to automate the process! These approaches are analogous to setting up an assembly line, complete with conveyor belts and computer-operated machine tools, in order to build one rifle.

The tools we need lie somewhere in between. The custom rifle builder uses a lathe, grinder and milling machine in building his product. Similarly, we need some *power tools* to help us work with the user. Why not an "analyst's work bench"[14] which contains a whole set of these tools? Such tools might include an interactive problem analyzer, a user-friendly data dictionay[15] and a cost-benefit analysis program that uses a color display to show development costs in red, benefits in blue and dollar payback in green!

### Methodology for System Definition

A methodology is a systematic framework that encompasses all the available tools and techniques and prescribes their use in a definite, well-structured sequence. The methodology becomes a recipe for top-down requirements generation.

A set of checklists, guidelines and heuristics will provide a reference set to measure the completeness and quality of the design represented by those requirements.

In the meantime, I solicit your comments and suggestions. If you are working in the real world, you may have a good way of navigating the user fog. That makes you an expert, and we all need to hear your ideas!

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*Rick Zahniser is the executive director of the Cibar Systems Institute, an educational consulting firm in Colorado Springs, Colo. He builds and teaches courses in the structured methodologies.*

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# Bits & Pieces

## Add-In Memory for VAX-11/780 Provides up to 256K Bytes

SANTA ANA, Calif. — Standard Memories Division of Trendata Corp. has introduced a semiconductor add-in memory with up to 256K bytes of storage capacity on a single card for use in Digital Equipment Corp. VAX-11/750 minicomputers.

According to Standard Memories, the Pincomm 750S consists of a 32-bit data word plus seven error-correction check bits.

The 750S is compatible with the DEC M8728 memory and occupies one memory slot with the VAX-11/750. First installations were made last month. The model costs $3,995, from the vendor at 3400 W. Segerstrom Ave., Santa Ana, Calif. 92704.

## Full Color Editor Added To Circuit Design Package

MENLO PARK, Calif. — Compeda, Inc. has announced a full color editor for its integrated circuit design package, Gaelic.

Features include interactive design rule checks and the ability to handle any technology and fabricator, the vendor said.

Systems are priced from $300,000, from the firm's U.S. office at 2180 Sandhill Road, Menlo Park, Calif. 94025.

## 'Micrographics Newsletter' Available for Free Trial

NEW ROCHELLE, N.Y. — Microfilm Publishing, Inc. is making available a free trial copy of its "Micrographics Newsletter" designed to focus on aspects of the micrographics field, including product news, companies and events, and provide detailed coverage of computer-output microfilm (COM).

Profiles of micrographics industry companies, stock market performance and a classified ad section of jobs, equipment and services are available to readers on a one-year subscription basis, costing $88 in the U.S. and Canada and $105 overseas.

Microfilm Publishing may be reached through P.O. Box 313, New Rochelle, N.Y. 10804.

## UPS Gives 10- to 30 Sec Of Power in Utility Outages

STAMFORD, Conn. — An uninterruptible power supply (UPS) said to provide 10 to 30 seconds of power to a computer during utility interruptions has been announced by Continental Power Systems, Inc.

Competing with systems that protect against outages for only "a fraction of a second," Powerotor is said to allow users to stop computer operations "in an orderly manner or to start a standby power source."

Model A7-603, rated at 7.5 KVA, 120/208 Vac, three-phase and 60 Hz, costs $19,950. The firm is located at One Landmark Square, Stamford, Conn. 06901.

# Tank Car Maker Steams Ahead With Custom Electronic Office Stoked by Large-Scale CPU

**By George F. Knorps**
**And Dennis M. Reddington**
Special to CW

CHICAGO — While most companies were busy discussing office automation or waiting for minicomputer vendors to unveil their "office of the future" bagatelles, an oil tank car manufacturer here implemented its own electronic office on a large-scale mainframe.

GATX Corp., a company that not only concentrates on tank car manufacturing but also has about eight other transport-related businesses, uses a custom-built electronic office information system (EOIS) to generate documents, transmit data to its nationwide locations and perform various electronically aided management functions.

The system operates from an IBM 3031 VM/370 computer based at the company's Niles, Ill., data center. The mainframe communicates with user workstations, distributed document printers and an IBM 370/158 here at the firm's Chicago headquarters.

The beauty of the 370-based pilot office system is that it utilizes standard IBM software components that have been available to users for quite some time. These programs include Vnet/RSCS, Hasp/NJI and other communications-oriented packages.

A menu-oriented office system package is the only nonstandard software component of GATX's EOIS. This program was designed and developed by SEI Information Technology, a company also based here, and GATX's corporate software support group.

This user-friendly software reportedly allows users to perform basic word processing and electronic mail tasks without extensive training and lets the busy company take advantage of temporary personnel who can come in and use the system without any great orientation.

### Criticisms Answered

The interface program also reportedly eliminates many historical criticisms of using host-based text processing systems rather than vendor-supplied word processing equipment. These criticisms focus on beliefs that sophisticated computer host text processors are too complicated for the average office worker to use and that traditional data processing CRT terminals are not effective word processing workstations.

Other major software components in the system include IBM's Edgar full screen text editor and the University of Waterloo's Script text processor. Edgar is used to perform common text manipulating functions, while Script takes care of basic text format-

*(Continued on Page 58)*

### *Future Systems — Part 2*

# Circuit Speed Viewed Jumping Tenfold by '85, Then Leveling

**By Frederic G. Withington**
Special to CW

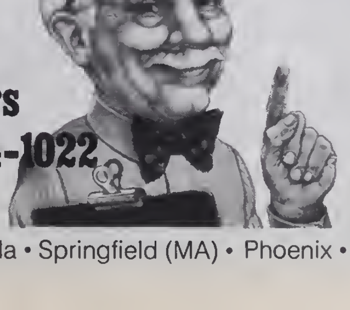
CAMBRIDGE, Mass. — Within the next five years, circuits for computer logic and storage will probably be 10 times faster than today's devices. Beyond that level, further improvements will be harder to come by, though some surprises may be in store after 1985.

This idea suggests that improvement in circuit performance per dollar cost will be about tenfold that of today's machines in 1985. Simply put, circuits of today's performance level will cost roughly one-tenth their current price, while conventionally organized computers will have speeds approaching 100 million instructions per second (Mips).

An important factor in determining the architecture of tomorrow's processors, however, derives from the desire to manufacture circuits in the most standardized form possible. Presently, it is and will continue to be expensive to design an individual integrated circuit. On the other hand, the manufacturing cost of a circuit is extremely low. Therefore, it is more economical to borrow a lesson from the calculator manufacturers and effectively waste already established circuit functions than to totally design a new circuit.

*This article is the second in a four-part series authored by Frederic G. Withington of Arthur D. Little, Inc. that deals with the sometimes clouded future of computer systems. This week, the systems guru examines improvements in circuit architectures and looks at storage and I/O developments.*

*(Continued on Page 60)*



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# Planning Service Debuts

SCOTTSDALE, Ariz. — A planning, costing and productivity analysis service is available from PMA, Inc. The service produces hardware and staff capacity plans and the expense budgets necessary to support those resources, the vendor claimed.

The service can determine standard costs for each DP resource group, task or activity, and prices to charge for 100% recovery, a spokesman said. It can also determine costs and prices for user units of work, such as checks, invoices or customers supported.

The analysis takes between one and three weeks and the charge is typically $5,000 to $15,000.

PMA may be reached through Box 4605, Scottsdale, Ariz. 85258.

# Mini-Based Turnkey Rivals 370

NEW YORK — A turnkey system built around the Systems Engineering Laboratories, Inc. Concept 32 minicomputer has been announced by New York Program Resources, Inc.

The 256K-byte CPU is reportedly comparable to the IBM 370/148.

The system includes availability of Fortran, Basic, Cobol or Pascal compilers, word processing, Hasp interface, Versatec plotting and Total data base, the vendor spokesman claimed.

### Targeted User

The system was designed for use in high-transaction volume business, military environments and high-speed engineering and industrial applications, the vendor said.

The Concept 32 CPU is priced at $25,000 with various configurations available from New York Program Resources, Inc., 369 Lexington Ave., New York, N.Y. 10017.

# Tanker Maker Automates

(Continued from Page 57)

ting.

The primary user workstations in the EOIS are IBM and IBM 3270-compatible CRT terminals. The system also is linked to a number of Xerox Corp., Diablo Systems, Inc. and IBM low- to high-speed printers.

### Hard-Copy Terminals

The system also supports hard-copy printer/keyboard terminals offered by Xerox and Texas Instruments, Inc. These terminals access the EOIS through a low-cost packet-switching network so that users only make local exchange calls.

Hard-copy terminals are used by the company's information systems managers who take the units along on business trips or pack them along when work is taken home.

The terminals can be used by the managers to create or revise documents which can then be mailed to the home office for final editing and distribution.

The company's sales personnel also use the terminals to send and receive mail and messages.

### User Costs

The EOIS costs GATX user departments about $100/mo for each workstation and its associated communications hardware.

The CPU cost passed on to each user averages between 75 cents and $1.50 per page depending on the length of the page.

Many departments used CRT terminals for data processing tasks before the EOIS was available.

They were able to take advantage of performing office system functions in addition to their data processing needs without incurring additional hardware expenses.

Not satisfied to rest on past achievements, GATX will this year update the systems capabilities to include front-end word processors, such as Wang Laboratories, Inc. equipment; and provide electronic filing for all corporate and subsidiary-level departments.

The firm also plans to implement a "tickler" file and provide document optical scanning support to capture text generated from outside sources.

*Knorps is manager of Support Systems at GATX and Reddington is a consultant with SEI Information Technology.*

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# Northern Telecom Adds WP, DDP for Model 70 Users

NASHVILLE, Tenn. — Northern Telecom, Inc. is offering a plan that reportedly enables users of its batch terminal systems to take advantage of the company's distributed data processing (DDP) capabilities.

The plan provides a logical growth path for the vendor's Model 70 series users to add DDP functions, including local Cobol processing to their existing remote batch terminal systems, a spokesman said.

In addition, those same users can take advantage of the Omniword word processing (WP) and IBM 3270-emulation capabilities.

Phase one of the four-step implementation allows remote batch terminal users to attach the Model 585 processor to Model 70 printers (300- and 600 line/min) and magnetic tape drives (9-track, 800- and 1,600 bit/in.) directly or through dual controller channel to the Model 70 processor.

Phase two provides an enhanced IBM 3780-emulation capability on the Model 585 processor.

Phase three allows the Model 585 processor to be attached to a Model 70 series card reader (1,000 card/min) for use with a printer or magnetic tape.

Phase four provides a dual controller channel interface between the Model 76 and the Model 585.

There is a $390 charge for the printer and cable, the 800- and 1,600 bit/in. magnetic tape adapter, the dual controller channel and the card reader and cable, the vendor said from International Plaza, Nashville, Tenn. 37217.

# *MX-70 Joins Epson Printers*

TORRANCE, Calif. — A dot matrix printer with a disposable printhead with a 50- to 100-million-char. lifespan is available from Epson America, Inc.

The MX-70 prints unidirectionally at 80 char./sec, with a user-defined choice of 40 (double-width characters) or 80-col printing. It provides top-of-the-form recognition, programmable line feed and form lengths and a self-test mode. The printer also features Graftrax II, a high-resolution (60 dot/in.) function, at no charge.

The printer costs less than $450 from 23844 Hawthorne Blvd., Torrance, Calif. 90505.

# UpgradeDoubles M/Net Capacity

SAN FRANCISCO — Micromation, Inc. has doubled the capacity of its M/Net system by adding an intelligent console processor (ICP) board, thereby relieving the master processor of the bulk of its I/O responsibilities.

According to Micromation, as a result of the new configuration, a single-user system is upgraded by installing a satellite CPU/RAM card for each additional station required.

The ICP board provides a Z80A and type-ahead buffers dedicated to console I/O. M/Net systems range from $5,500 for the single-user module to around $23,000 for the full eight-user system with hard disk. The vendor is located at 1620 Montgomery St., San Francisco, Calif. 94111.

# Interface Links Videodisk, CPU

COSTA MESA, Calif. — Discovision Associates has introduced two products designed to link industrial videodisk players and computers.

The PR-7820-2 Videodisc Player provides two-way communications with most computers, faster access time and new programming functions, the vendor said. The Universal External Interface (UEI) converts data from the PR-7820-2's internal microprocessor into most communications formats.

The PR-7820-2 can be connected directly to a host processor using the player's two-way bus through a standard connector. An 8-bit parallel communications protocol provides controls for send, receive, acknowledge commands and status information between the player and the processor.

The UEI communications adapter provides either a standard RS-232C serial interface or an IEEE 488 parallel interface for the PR-7820-2. It can receive and buffer a series of player commands from the host and relay them to the player on command.

The purchase price of a PR-7820-2 player is $2,475, with discounts for quantities of 25 or more. Customer's PR-7820 players may be upgraded to the PR-7820-2 at a DVA depot at a cost of $325 each, plus shipping charges. The UEI is priced at $225.

Initial shipments of PR-7820-2 players and depot upgrades of PR-7820 players are scheduled to begin in March, the UEI in April. The vendor is located at 3300 Hyland Ave., P.O. Box 6600, Costa Mesa, Calif. 92626.

# 'Hands-Free' System Fights Tailgating

ATLANTA — Sterling Industries, Inc. is offering a "hands-free" security system for computer rooms.

The Mastiff Electronic Security Control System provides 24-hour surveillance and prevents tailgating and other forms of improper entry, the vendor claimed.

A typical system costs between $30,000 and $50,000, the vendor said from Suite 545, Pleasantdale Business Center, 4029 Pleasantdale Road, Atlanta, Ga. 30340.

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## Display System Emulates 3250

WOODLAND HILLS, Calif. — A graphics display system said to emulate the IBM 3250 class of display equipment has been announced by Vector General.

The VG 8250 has channel speed of up to 1.2M byte/sec, and the operation of the selector, block multiplexer or byte multiplexer in real mode produces a system that can support 32 terminals, the vendor claimed.

The system also features a hand-held tablet digitizer.

Price of the VG 8250 depends on configuration, with an eight-display station cluster, including communications front end priced at $230,000 from Vector General, 21300 Oxnard St., Woodland Hills, Calif. 91367.

## Circuit Speed Seen Rising Tenfold by '85

*(Continued from Page 57)*

Presently, a great deal of research is being performed into auxiliary storage technologies including magnetic bubbles, charge-coupled devices, laser-holographic devices, video disks, cryogenic devices and others. This research will gradually result in the introduction of new types of storage subsystems. However, there is still a great deal of room for improvement in conventional magnetic technology.

Most magnetic improvements will be in the form of increased recording densities. An area density improvement factor of at least 10 appears theoretically possible. This improvement will undoubtedly result in a much lower cost per bit for magnetic disks, lower through at least 1983 than newer technologies can match.

However, access times to magnetic disks will remain a problem even if head-per-track arrangements become general. For this reason, it seems likely that hierarchies of auxiliary storage devices will continue to be used for many years, with newer technologies appearing first at the high-speed, low-capacity end of the spectrum.

Either magnetic bubbles or charge-coupled devices will be in widespread use by 1983, although evolving MOS remains an effective competitor.

### Likely Occurrences

Although a proliferation of I/O device developments is likely to occur, there will be a number of interesting occurrences.

Electromechanically oriented devices such as punched card handlers and impact printers will undergo relatively little changes in cost-effectiveness, but electronic functions will be substituted for mechanical ones where practical. The greatest amount of change in this area will occur in nonimpact printers. For instance, thermal printers are steadily dropping in price and improving in performance. Electrostatic and ink-jet printers not only promise higher speeds, but also greater versatility, offering multiple colors, multiple fonts and forms generation.

One of the more novel and interesting I/O technologies appears to be voice recognition. However, it faces the problem of determining "meaning" that has always constrained optical character recognition. Some voice input systems are already available for recognizing spoken phonemes and with restricted abilities or recognize complete words and sequences.

### Terminal Evolution

The evolution of remote terminals is of the greatest significance to most users' network systems. Among display technologies, it appears that the CRT with its versatility and low cost will remain dominant indefinitely. However, the plasma or gas discharge flat panel display is steadily improving in resolution, legibility and cost. For small displays, from a few characters up to one or two lines, the LED is most favored for its price, compactness and brightness.

In some respects, the most interesting evolutionary trend in terminals is their increasing intelligence, as component processors are incorporated into them. Microcomputers were first used in terminals to replace hard-wire logic with stored logic to reduce manufacturing costs. However, as time goes on, increasing processing, editing and human factors support functions that will be imbedded in the micros. The application orientation of terminals will begin to dominate considerations of standardization and cost-effectiveness.

In the future, it seems likely that application-dedicated terminals will proliferate and that users will increasingly participate in the definition of their functions.

*Withington is the vice-president of Arthur D. Little's Information Systems Group in Cambridge, Mass.*

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## VAX Gets Interface To IEEE 488-1978 Bus

AUSTIN, Texas — National Instruments has announced a DMA interface between Digital Equipment Corp.'s VAX-11/780 minicomputer and the IEEE standard 488-1978 instrumentation bus.

The GPIB11-2/VX is a hex wide card which interfaces to the VAX Unibus adapter and reportedly provides hardware for decoding various GPIB commands for Talker, Listener and Controller functions.

The interface, costing $2,495, is available from 8900 Shoal Creek Blvd., Austin, Texas 78758.

## Correction

The correct address of Comtal Corp. ["System Digitizes Film Images," CW, March 2] is 505 W. Woodbury Road, Altadena, Calif. 91001.

# Announcing the IDMS Data Center for the exclusive use of our IDMS customers.

Effective immediately, Cullinane Database Systems, Inc., has available an IDMS Data Center for the exclusive use of our IDMS customers. The IDMS Data Center includes multiple computers operating the complete family of Cullinane database software, with access provided by a nationwide telecommunications network. As a new IDMS user, you can begin development of applications prior to installation of your hardware. Production systems may also be run at the IDMS Data Center, supported by the most knowledgeable people in IDMS—the Cullinane staff. This will be particularly helpful to companies awaiting delivery of computers or for IDMS users with limited computer resources.

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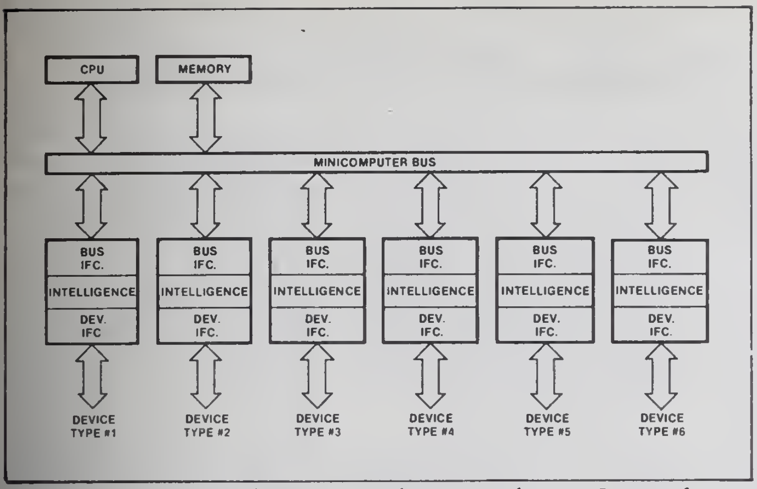

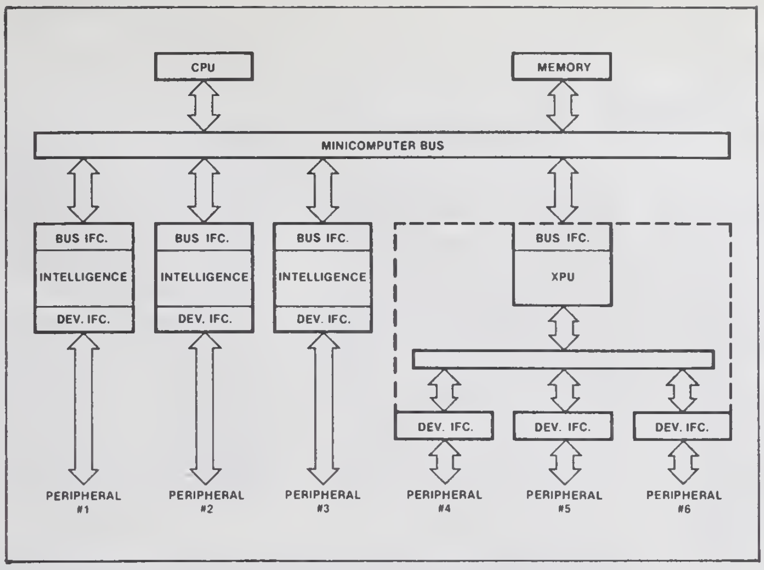

*These charts, supplied by National Semiconductor Corp., show a typical minicomputer bus (above) and National Semi's implementation of its transfer processing unit (right).*

# Multiple-Device Controller Introduced

By Tim Scannell
CW Staff

SANTA CLARA, Calif. — National Semiconductor Corp.'s Memory System Group recently unveiled a controller and add-in memory for Digital Equipment Corp. computers to reportedly borrow from disk-drive technology to go above and beyond the plug-in call of duty.

The Hexacon single-board controller incorporates a transfer processing unit (XPU) microengine, developed by the Memory Group, to simultaneously control up to three types of peripherals: disk, tape and additional memory.

The DEC Unibus-compatible controller juggles data transfers to and from up to four RM02-emulating disk drives, up to four DEC-compatible tape drives and a DEC RM04 fixed-head disk (FHD). The FHD slot can be utilized by the user to add up to 8M bytes of Nuram memory, also unveiled by the California firm.

The controller's bottom line, from a user standpoint, is that it essentially frees two slots on the computer's already crowded backplane. The XPU microengine-driven controller is the first DEC-aimed product that is capable of multiple-device control, Tom Knight, the group's head, explained.

### Memory Team

National Semi's memory team — which was established about six years ago, but started chasing DEC's customer base within the past 18 months — developed the multicontrol concept by examining disk characteristics, Knight stated. For instance, under ideal conditions, most SMD-type disks will function at an instantaneous transfer rate of about 1,200K byte/sec. A 100% relative performance. However, like the milage ratings attributed to new cars, disk drives don't always function at their maximum vendor hyped speeds.

In fact, the relative performance of typical disk drives may vary from a low of 4%, or 50.7K byte/sec, to a high of about 81%, which is a rate of around 975K byte/sec, Knight pointed out.

So, using this disk knowledge as a base, National Semi built a controller that would effectively utilize the time the disk is not sending information up or down the computer system's Unibus. That is how the multicontrol concept was born. When the Unibus path is clear from the disk's angle, other peripherals can use that free-time space, Knight said.

To keep a steady flow of data up and down the Unibus, the controller incorporates a cache-like 4K-byte control store memory that sends informational bursts, rather than data bits and pieces, down the pipeline. The board also has 48 internal registers, self-test diagnostics, a multi-level interrupt scheme and only 198 on-board components, as opposed to about 500 components contained on three separate controller cards.

The Nuram self-diagnostic bulk memory, introduced at the same time as Hexacon, was designed to function just with the new controller board. The Nuram add-in delivers from 2M- to 8M bytes of memory by emulating DEC's RS04 FHD drive.

> *'The controller's bottom line, from a user standpoint, is that it essentially frees two slots on the computer's already crowded backplane. The XPU microengine-driven controller is the first DEC-aimed product that is capable of multiple-device control.'*

The most significant aspect of the plug-in memory is that it has a multiredundancy feature that allows spare random-access memories (RAM) to be substituted when an in-use RAM fails. In fact, with 16 spare RAMs per 1M byte, the system is not only suited for continuous "on-the-fly" operations, but can reportedly outlive traditional nonredundant RAM memories.

To date, only one other vendor offers a similar redundant operation memory system that functions with a specialized controller — Intel Corp. However, the Intel system costs about four times as much as National Semi's entry, Knight claimed.

Purposely configured with a maximum of four defective RAMs and a plethora of spares — which reduces the cost of having to severly test single RAMs to ensure 100% accuracy — Nuram uses a fail-safe method of data storage. When a RAM burns out or exceeds its life span, the system's memory mapping feature moves data to one of the available spare RAMs. A built-in programmable read-only memory keeps track of defective RAMs and indicates where the fresh locations are located, Knight explained.

When the memory board reaches a threshold limit, a yellow light flashes on the board indicating to the user that the memory is reaching its last RAM legs and the whole unit will soon have to be replaced. When a red light flashes, the user is signaled that replacement should be done immediately.

With current add-in RAM memories, the user has no indication of how much life is left in the board or how soon to replace the unit. Also, if a RAM fails in a conventional board, the data is most likely lost, Knight said.

The reliability of the Nuram unit is so high that National Semi is offering a total replacement "insurance policy" that costs the user about $10 per year. If and when the card fails, the whole board is replaced free of charge, Knight noted. National Semi is believed to be the only vendor to offer such a total replacement deal.

The Hexacon controller is priced from $3,000 to $6,500, depending on device configuration, which is from about 35% to 70% cheaper than DEC single-peripheral controller models, Knight claimed.

The Nuram memory, which only works with the Hexacon controller, costs $9,500 per 2M-byte increments.

Deliveries on both the controller and the add-in memory are scheduled to begin in early June, although evaluation models of the controller are available for shipment now, the group director said.

National Semi's headquarters and its Memory Systems Group is located at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

# Multiworkstation System Bows

COLUMBIA, S.C. — A multiuser workstation system that shares a common data base or allows individual workstations to retain restricted data bases, is available from Intertec Data Systems Corp.

Compustar's system architecture was designed around a network of workstations, all of which employ an internal microprocessor, and 64K bytes of random-access memory and share the resources of a single hard-disk device.

Four models of the workstation, ranging in price from $2,500 to $5,000 are offered.

Data Systems Corp. is headquartered at 2300 Broad River Road, Columbia, S.C. 29210.

# *Z8000-Based MPU Runs Under Unix*

WELLESLEY, Mass. — Onyx New England is offering what it claims is the first microcomputer to be built around Zilog's Z8000 processor and licensed to run Bell Labs Unix operating system.

The C8002 can support up to eight users and combines an 18M byte disk drive, cartridge tape drive, 16-bit processor and up to one million characters of main memory in a single enclosure.

According to Onyx, the power of the C8002 lies between that of the DEC PDP-11/34 and the PDP-11/45. The system, including the Unix license, is available for $20,000 from 554 Washington St., Wellesley, Mass. 02181

# *Portable Bar Code Reader Extends 5351 Terminal*

GLENDALE, Calif. — A bar code system is available for all IBM System/34, System/38 and Series/1 computers from Cass Marketing Services, Inc.

The bar code reader is a portable data collection device that may be used as an extension of the IBM 5351 terminal. The reader enables data to be collected in warehouses, stockrooms, construction sites and other difficult environments and is easily interfaced with the IBM 5251 terminal, the firm said.

The bar code printer can be interfaced with the System/34, System/38 and Series/1, as well as the System/3.

The 300 line/min printer costs $9,950 and the 600 line/min printer costs $13,000. The stationary bar code reader costs $2,800 and includes a System/34 interface and wand reader. The portable reader also costs $2,800 and includes the portable unit, interface adapter, rechargeable battery pack and auxiliary battery pack and cable.

The vendor is located at Suite 838, 535 N. Brand Blvd., Glendale, Calif. 91203.

# Corvus Unveils 5M-Byte Disks

SAN JOSE, Calif. — Corvus Systems, Inc. has unveiled a family of 5M-byte add-on Winchester disk systems to fill the gap between 1M-byte and 10M-byte end-user disk add-ons.

The 5M-byte drives interface with a variety of microcomputers, including Apple Computer, Inc. and Altos Computer Systems, Inc. equipment, as well as all S-100 bus-based computers running under CP/M or Oasis.

A system package consists of the drive, which is the size of a 5.25-in. floppy; an intelligent Z80-based controller card; an intelligent interface card with firmware and software appropriate to the given model of microcomputer; and a complete power supply adaptable to line standards worldwide.

## Performance Specs

Performance specifications include an unformatted data capacity of 6.9M bytes; a minimum seek time of 10 msec and average seek and latency times of 50- and 8.3 msec, respectively. Power consumption is 120W.

The drives are compatible with Corvus' Mirror and Constellation, the vendor said. The retail price for the Corvus 5M-byte disk system is $3,750.

Quantity discounts are available, the vendor said from 2029 O'Toole Ave., San Jose, Calif. 95131.

# Computhink Adds Two Micros To Minimaxes

SUNNYVALE, Calif. — Two new models of its Minimax line of small computers geared toward applications in the small business and scientific calculations markets has been announced by Computhink, Inc.

The smaller of the two models, Model 50, has 86K bytes of main memory (46K bytes user memory) and 1.2M bytes of 8-in. dual floppy disks. The use of full track buffering for both directories and data storage allows the system, according to Computhink, to access data without doing an additional directory seek for each file that is being used by the customer's application.

The second model, the Model 100, has 86K bytes of main memory, 2.4M bytes of floppy disks and contains an optional medium resolution graphics capability.

The Model 50 costs $6,950 and the Model 100 $7,950. Deliveries are available April 1 from Computhink, 965 W. Maude Ave., Sunnyvale, Calif. 94086.

# System Based On Level 6

CLARK, N.J. — The Ultimate Corp. has added the Model 4303B1 to its line of systems based on Honeywell, Inc. Level 6 hardware. The model consists of a 64K MOS memory, 48M-byte fixed and 16M-byte removable disk and a 45-in./sec tape drive.

The configuration also features main memory expandable to 256K bytes, expansion to seven CRT terminals, three open ports and a printer port, the vendor said.

The Model 4303B1 system is available at a price of $53,000 from Ultimate Corp., 77 Brant Ave., Clark, N.J. 07066.

# *Employee Benefit System Based on PDP-11*

ANN ARBOR, Mich. — A minicomputer-based system for employee benefit plan recordkeeping has been introduced by the Trust Services Division of Comshare, Inc.

The Digithrift software features both novice and expert modes, an automatic error correction device, help messages, the ability for users to view the results of their work at any time and certificate printing.

Digithrift runs on Digital Equipment Corp.'s Datasystem 538, which includes a PDP-11/34 processor with 256K of memory.

The initial license fee for Digithrift software costs $65,000 with a $6,000 annual maintenance fee. Hardware configurations depend on the customer's needs, a spokesman said from 3001 S. State St., Ann Arbor, Mich. 48106.

## *For Wholesalers, Retailers*

# Accounting Turnkey Offered

TEMPE, Ariz. — A fully integrated computerized accounting turnkey system for small- to medium-sized retailers and wholesalers is available from R&R Computer Systems, Inc.

The software for the system includes sales order entry, accounts receivable, general ledger, accounts payable, purchase order, inventory and payroll modules.

Word processing also is available.

### Hardware Included

The hardware includes the Model 720 64K-byte CPU, the Model 810 dot matrix printer and the Model 135 video terminal.

For increased storage capacity, the Model 16,800, a 16.8M-byte hard-disk system with tape backup, is available.

The hard-disk system can handle up to 10,000 items each of inventory, general ledger accounts, vendors, employees and customers.

The entire package, including five days of in-house training, costs $22,995.

R&R Computer Systems is located at 1954 E. University, Tempe, Ariz. 85281.

# Course Set On How To Buy Minis

ST. PAUL, Minn. — "Successful Selection of Minicomputers" is the title of a two-day seminar being offered by RHY Consultants, Inc. in conjunction with the Canadian Institute of Chartered Accountants.

The program is slated to take place in St. Louis, April 27-28; in San Francisco, May 11-12; in New York, June 1-2; and in Atlanta, June 22-23.

### Targeted Student

This course is suggested for both the consultant who must make recommendations regarding acquisition to clients and the business executive faced with the problem of selecting the right equipment, RHY said.

Admission to this program is $325 per person.

Further details are available from Stephanie Gaubatz at RHY Consultants, Inc., P.O. Box 21026, St. Paul, Minn. 55121.

# Xycom Board Acts as Micro Or Master/Slave

SALINE, Mich. — A memory board that can be used as a stand-alone microcomputer or as a master or slave in a multiprocessor environment has been announced by Xycom, Inc.

The 1868+A is a 16-bit microcomputer module with the company's Z8001 microprocessor and has 8K bytes of erasable programmable read-only memory (Eprom).

The model also has up to 20K bytes of local random-access memory (RAM) as well as access to 64K bytes of main system RAM, the vendor spokesman claimed.

The 1868+A's two-channel serial I/O chip is capable of serial communications up to 500K bit/sec, and has memory access times of 750 nsec per word, the vendor said.

The 1868+A is available from inventory at $2,095 each from Xycom, Inc., 750 N. Maple Road, Saline, Mich. 48176.

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For more information write: Perkin-Elmer, Marketing Communications, 2 Crescent Place, Oceanport, NJ 07757. **Or call toll free: (800) 631-2154. In NJ, call (201) 870-2412.**

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# Third-Party Firms To Hit $8 Billion By 1990

WASHINGTON, D.C — Annual revenues from third-party leases and sales of computer equipment should reach more than $8 billion by 1990, according to statistics compiled by the Computer Dealers and Lessors Association (CDLA).

At that time, annual third-party sales revenues will pass the $5 billion mark, with lease revenues growing at a slower rate and making up the remainder of the annual revenues.

Today revenue from leases provides $1.6 billion annually, while third-party sales of all computer systems and peripherals is at the $1 billion level. Of current lease revenue, IBM 370 and 30 series equipment provides about 94% of revenues, with IBM 360 and all other equipment and peripherals taking up the slack.

The CDLA projected the next five years should present excellent opportunities for third-party vendors since IBM has an acute need for cash. IBM's cash requirements are between $8 billion and $15 billion, estimated James F. Benton, executive director of CDLA.

IBM's need for capital has already been observed as its working capital in 1980 declined $1 billion from 1979 levels.

IBM needs cash for financing plant mod-

*(Continued on Page 71)*

## New Concepts Needed

# Japanese Industry Told To Break From IBM Mold

**By Marcia Blumenthal**
CW Staff

TOKYO — Japan's continued leadership in the worldwide computer industry rests on its ability to cease imitating IBM technology and build new systems based on original concepts, a report based on two years of study maintains.

Japan's recognition of the need to break the IBM mold is one of the challenges set forth in a report recently published by the Committee for Study and Research on Fifth-Generation Computers, formed by the Japan Information Processing Development Center (Jipdec). The two-year study on which the report is based was initiated by Japan's Ministry of International Trade and Industry and carried out by Jipdec.

The Jipdec study envisions fifth-generation computer systems that emphasize specialized rather than general-purpose functions. Those systems would not be based on Von-Neumann architecture and are likely to be composites made up of a number of specialized processors, hardware, software and firmware elements.

Specialized processors to be used in these systems include high-level language processors, data base machines, associative processors, memory level control and image processing systems.

### KIP Systems

Emerging during the 1990s, fifth-generation systems should be categorized as knowledge information processing (KIP) systems. The two essential features of a KIP system would be high-level man-machine interfaces and the ability to solve problems.

Man-machine interfacing requires that all forms of input — natural language, patterns, images, handwriting and speech — be input conversationally. The KIP system should also have intelligent dialog capability such as answering questions, making suggestions and giving summarized answers, the report suggested.

To provide these capabilities, fifth-generation machines will have to process data on a nonnumerical basis.

KIP systems will have to provide functions today's computers cannot fulfill. Users must be able to obtain information in any form. Current systems have too many restrictions on the variety, volume and the format of information. Moreover, future systems must be able to perform large-scale simulations of

*(Continued on Page 70)*

# Soviets Stepping Up DP Production

**By Brad Schultz**
CW Staff

MOSCOW — The Soviet Union is stepping up production of high-speed computer systems and will produce hundreds of thousands of microcomputers and microprocessor sets in the next few years to satisfy "requirements of the Soviet economy."

So said Prof. Vladimir A. Myasnikov, a top official in the Soviet computing community, in a brief report released here recently. The Soviet Union has built a "mighty base" for manufacturing computers and peripheral devices, Myasnikov declared, and is working with other countries through the Council of Mutual Economic Assistance to develop a prototype system for process control.

Myasnikov heads the Department of Computing Engineering and Control Systems, a component of the Soviet State Committee for Science and Technology. According to him, the Soviet Union has created a new generation of ES (Ryad) mainframes, two to 10 times more powerful than the previous generation, which has been called a virtual duplication of IBM's 360 family.

Western observers maintain that look-alikes of IBM's 370 family are reaching civilian users in the Soviet Union as members of a Ryad-2 series. Myasnikov reported that the latest Ryads have improved direct-access memories, much greater mass storage capacities, array processors that facilitate scientific applications and time-sharing facilities.

More than 5,000 computer systems now operate in the Soviet Union, Myasnikov stated. More than 2,000 of them reportedly engage in process control, supporting such industries as metallurgy, chemical, petroleum, paper and electric power. The systems typically pay for themselves within two years, he claimed.

### Mini Generation

The professor also reported a new generation of minicomputers, including the SM-1, SM-2, SM-3 and SM-4 models. The SM series features memory capacities ranging from 30,000 to 120,000

*(Continued on Page 72)*

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# Study Tells Japanese to Break From IBM Mold

(Continued from Page 69)

unknown conditions to help formulate new ideas.

In particular the Jipdec report targeted 12 technological areas for research and development, placing special stress on large-scale integration (see accompanying story).

### Japanese Strategy

In evaluating the strategy to be followed by Japan, Jipdec noted the trend has been to keep the hardware of systems as simple as possible while developing sophisticated software to enhance the system's capability.

Ironically, as software grows in volume and complexity, there is little improvement in programming productivity. By 1985 software costs will comprise 80% to 90% of a system's cost, the report said.

To keep the cost of systems down, researchers must reexamine basics such as computer structure and fundamentals of language theory to determine the software approach to be taken for the 1990s.

While recognizing technical constraints of systems, the committee formulating the Jipdec report focused on how information processing (IP) systems could help solve the social problems that face Japan.

The study committee was comprised not only of computer specialists, but also sociologists, futurists and philologists.

The report called for IP to improve productivity in low productivity areas such as agriculture, fishery, distribution and public service.

Japan must find ways of reducing its work force as its population ages. By 1990 12% of the country's population will be 65 years or older.

### Health Care

Moreover, the country must find ways of using automation to make delivery of health care services more speedy and cost-effective, the report said.

The committee also stressed IP is a means of preserving a competitive position for Japan in the world economy. It is impossible for Japan to be self-sufficient in agriculture and the country can only supply 15% of its energy needs.

The country's most precious asset is its highly educated and motivated work force that can produce value-added products for exchange on world markets. At the forefront of these products are not only processors but also data base systems, high-level software packages and intelligent robots.

## *Japan's 12 Targets For Research and Development*

TOKYO — In planning for its fifth-generation of systems, the Japan Information Processing Development Center targeted 12 general areas for research and development:

- *Device technology*. This includes practical applications of new devices such as Josephson Junctions and chemical compound semiconductors to compensate for the limitations of silicon units. In addition, methods for introducing very large-scale integrated semiconductors is a necessity.
- *Architecture and high-performance processors*. Japanese research and development should concentrate on non-Von-Neumann architecture, data flow machines, data base processors with association and inference functions, ultra-high-performance machines for large-scale simulations and very high-speed computing; machines with new address systems, such as parallel processing; and one-level stores.
- *Function distribution systems*. This involves creation of processors with special functions and of systems combining these special-function machines. This includes high-level language processors, data base machines and associative processors, among others.
- *Systemizing technology*. This includes developing processors with automatic synthesis of module elements, including optimized burden sharing for hardware, software and firmware.
- *Network architecture*. Such architecture should provide for the union of communications and information processing encompassing international standards.
- *Office automation*.
- *Computer*-aided design and manufacturing systems.
- *Practical application of artificial intelligence*. This includes the practical application of pattern-recognition technology, encompassing recognition of speech, figures, and three-dimensional objects.
- *Software engineering*. Among developments urged for this area are specification writing and program modularization.
- *Data base technology*.
- *Intelligent robots*.
- *High reliability and security protection functions*.

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## *With 'Not Just Another CRT'*

# HDS Keeping Pace in Crowded Terminal Mart

By Marcia Blumenthal
CW Staff

PHILADELPHIA — Why would two young entrepreneurs seeking an entry into the computer market choose the already crowded terminal arena?

"Well, we don't make just another CRT," countered Roger S. Pincus, executive vice-president of Human Designed Systems, Inc. (HDS). Moreover, the five-year-old company isn't oriented to the IBM world or the fast-growing clustered processing market.

What HDS does produce is high-capability, stand-alone terminal systems. Orginally the founders of the company saw a great opportunity in APL terminals and its Concept product line is built around APL capability.

However, the APL market was not large enough to sustain specialization in APL terminal sales. Today sales of the company's terminals outshine APL terminals by a factor of five to one.

Pincus thinks HDS has been able to fit its product to the market because the founders were experienced in the user end of the market rather than coming from an electronics firm.

Prior to founding the company, Pincus was manager of financial software for TMI Systems Corp. and had worked on APL printed circuit board layouts for Bell Laboratories.

Cofounder and President Mark Gelberg was formerly director of computer services at the University of Pennsylvania's Wharton School.

### Function Key

One user-oriented characteristic of HDS' Concept 104 terminal is function key programming. A lot of terminals have separate programs for function key programming, but there are different levels for that function, Pincus pointed out.

For example, the ability to change what the function key transmits can be considered a higher level capability for that key.

HDS' Concept 104 terminal does have that capability. And this month the company is introducing its second-generation terminal, Concept 108, which Pincus claimed offers 50% more user capability at the same price.

Terminals are priced at $1,575 per single unit and $1,230 per unit in OEM quantities of 75.

HDS targets its APL products to both OEMs and end users, particularly those at universities and sophisticated sites, such as Mobil Oil Corp., which uses HDS terminals for chemical analysis.

CW Photo by M. Blumenthal

Roger S. Pincus

In addition, HDS supplies on an OEM basis both I.P. Sharp and STSC, Inc., two companies that provide APL services.

Despite the relatively low price of its products, Pincus said price alone will not clinch a sale, particularly for an APL terminal. It must be a combination of price and function.

Users are not too hesitant to try out products from smaller terminal makers, as the product is relatively low-priced and not a major capital expenditure.

With sales currently at the $3.5 million level, HDS manufactures 150 to 250 terminals per month and plans to increase output to the 400 terminal-per-month mark by the end of the year.

The company has 40 employees and is served by three sales offices. HDS will double the number of sales offices this year.

# Revenues to Hit $8 Billion

*(Continued from Page 69)*

ernization and marketing geared to low-end systems, Benton suggested. The company is not going to let foreign or domestic competitors shut them out of this lucrative market.

Because of IBM's huge cash requirements, third-party vendors should do a whopping business in 3081s and follow-ons to the H series because the system is priced for purchase, the CDLA director explained.

A high percentage of 3081s will be purchased by third-party marketers, Benton maintained.

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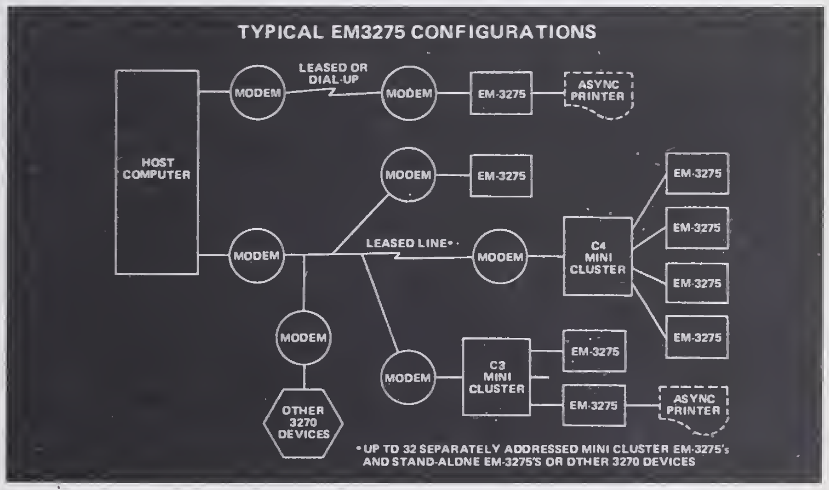

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## *Datapoint Buys TRW Network*

SAN ANTONIO, Texas — Datapoint Corp. and TRW, Inc. have reached an agreement on Datapoint's purchase of TRW's international sales and distribution network for Datapoint products.

The agreement provides for Datapoint's purchase of TRW's and some local interests in 10 distributorships in which TRW owns an equity interest and compensation to TRW for contract rights to market outside the U.S.

## Soviets Building 'Mighty' Computer Base

*(Continued from Page 69)*

words and can render 130,000 to 200,000 operations per second.

As for microcomputers and microprocessors, Myasnikov maintained that his country turned out 10 types of microprocessor sets in 1980 — hundreds of thousands of units, altogether — as well as thousands of microcomputers and 30 types of calculators, representing millions of units.

The Soviet Union will save more than 100 million rubles ($154 million) by 1990 with the microcomputers used to drive machine tools, Myasnikov estimated. The micros "release" machine tool operators, he pointed out.

"Today, practically all socialist countries have started using microprocessors and microcomputers for processing texts, for controlling storehouses, in peripheral devices and bank terminals, for controlling machine tools, in medical equipment, . . . for automation of experiments . . . [and] for automation of management," the Soviet official remarked.

This account of Soviet progress in computing suggests that the ban on U.S. sales of computer equipment to the Soviet Union, protesting its invasion of Afghanistan, has hardly demoralized the Soviet computer industry. Western observers have noted that Soviet users have problems moving software among supposedly compatible systems [CW, May 26], but Soviet progress in sophisticated aspects of data base management has been reported.

## Foreign Orders & Installations

Standard Data Systems, Inc. has announced the sale of a Prime Information System to McKnight Development Corp., which owns area franchises for 21 Wendy's hamburg restaurants and Church's fried chicken restaurants, as well as bowling centers and real estate ventures. The system will provide a multicompany general ledger, payroll, inventory management and communications network.

**Amity Leather Products Co. has ordered a large-scale computer system, valued at over $1.2 million, from Sperry Univac. The 1100/61 processor is scheduled for a June delivery.**

Telecredit, Inc. has ordered 5,000 merchant terminals and a number of terminal controllers from DMC Systems, Inc. of Santa Clara, Calif. The order is valued at approximately $1.75 million.

**The People's Republic of China has ordered up to $5 million worth of Z80-based small business microcomputers from Zilog, Inc. The Beijing Automation Technology Research Institute has agreed to puchase Zilog's MCZ 1/50 microcomputer systems and microcomputer board-level products for use in airline and hotel reservation systems, as well as for educational purposes at universities.**

The Hyogo Sogo Bank, Ltd. of Kobe, Japan, has installed a new on-line Sperry Univac computer system, valued at approximately $9.9 million. The computer, a Univac 1100/82 multiprocessor, was supplied by Nippon Univac Kaisha Ltd., the Sperry Corp. joint computer marketing venture in Japan.

**Handelsbanken, a leading Danish financial institution, has installed approximately $2 million worth of high-speed Racal-Milgo, Inc. data communications equipment as part of a nationwide modernization program of its data network.**

The New Zealand Ministry of Defense has ordered computer equipment and services, valued at $2.1 million, from Sperry Univac. The order, which includes a large-scale Sperry Univac 1100/62 computer system, will be used to upgrade present data processing facilities.

**The Republic of Korea has installed a System Century Digital Mobile Office ordered from Stromberg-Carlson, a subsidiary of General Dynamics, Inc. The digital exchange equiment will be placed on display at the U.S. Embassy Trade Center in Seoul.**

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# Executive Corner

- Valerian F. Podmolik has been elected president and chief executive officer of RCA Global Communications, Inc.
- William A. Gerard has been named senior vice-president of post trade services for the Securities Industry Automation Corp.
- Gene B. Rosen has joined Atari, Inc. as vice-president of engineering for the Atari Computer Division.
- Richard W. Pavely has been named vice-president of marketing for Bowne Information Systems.
- Michael J. Elton has been appointed vice-president and general manager of Technitron International, Inc., a subsidiary of Dyneer Corp.
- Robert C. James has been named vice-president of Office Systems at NCR Corp.
- John A. Carr has been appointed vice-president and general manager of the Codex Intelligent Terminal Systems Operation at Codex Corp.
- Nick Horn has been named vice-president of marketing at Mini-Computer Technology.
- Richard J. Casterline has joined International Entry Systems, Inc., as vice-president of sales and marketing.
- Ralph M. Armstrong has been named vice-president of marketing at Rexon Business Machines Corp.
- Jon K. Lineweaver has been appointed vice-president of Education Marketing for Control Data Corp.
- Kevin R. Murphy has been appointed vice-president of field operations at Point 4 Data Corp.
- William D. Jobe has been elected vice-president of marketing at ECS Telecommunications, Inc.
- Herbert J. Richman has been elected executive vice-president of Data General Corp.
- Richard A. Williams and Dr. Peter G. Jessel have joined Integral Data Systems, Inc., as vice-presidents of engineering and advanced development, respectively.
- George Thiergartner has been elected vice-president of corporate marketing at Aydin Corp.
- Dr. Harry M. Taxin has been promoted to vice-president of marketing at Gerber Systems Technology, Inc. Dr. Michael P. Carroll has been promoted to director of applications software development and Edwin F. Nicholson has been named director of operations.
- Richard A. Steel has been appointed vice-president of marketing for Datagraphix, Inc., a subsidiary of General Dynamics Corp.
- Robert A. Nazarenus has been named vice-president of finance and operations at Systel Computers, Inc.
- James E. Crickey Jr. has been appointed vice-president of U.S. government systems marketing at Control Data Corp.
- Richard B. Freibrun, Edward H. Burnet and Bruce Sherr have been appointed senior vice-presidents at Spectra Medical Systems, a unit of the Whittaker Corp. Larry Krassner has been promoted to vice-president of the firm's Eastern region.
- Darrell W. Green has been promoted to vice-president of CADO Systems International, CADO Systems Corp.
- Bob G. Davis has been appointed group vice-president of Network Systems at Northern Telecom, Inc.
- R.N. Hatch has been appointed vice-president of corporate sales and marketing at AM International.
- M. Nelson Boroughs has been named vice-president and general manager of E-Systems, Inc.'s Montek Division.
- Jerry Wedel has been named general manager of Vista Computer Co.
- Daniel E. Lott has joined Ampex Corp.'s Memory Products Division as manager of business development, a new position.
- Dennis M. Flannery has been promoted to assistant vice-president of operations at Data Information Systems Corp.
- Gary R. Larkins has joined Professional Computer Resources, Inc. as director of software product sales.
- S. Kent Foster has been appointed vice-president of finance and administration at Nestar Systems, Inc.
- William C. Shaw has been named manager of hardware engineering at Zentec Corp.

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## *And Looks to New Revolutions*

# From Edsac to VLSI, Session Traces History

By Molly Upton
Special to CW

SAN FRANCISCO — Amidst the theme of very large-scale integration (VLSI), the IEEE Computer Society Spring Computer Conference (Compcon) here recently gave attending engineers a capsulized view of their industry's history, including events that took place before many of the attendees were born.

Maurice Wilkes, professor emeritus of computer technology at the University of Cambridge, showed a movie detailing operations of the Edsac computer in 1949 and keynote speaker Carver Mead of the California Institute of Technology commented on the highways and byways the industry has taken since then, concluding with the current areas offering the most chance for revolutionizing the industry.

Wilkes, now with Digital Equipment Corp., commented that the film was basically a "commercial for subroutines." Despite some of the current problems with which the audience was overly familiar, such as the program queue, much has changed, he noted.

The Edsac had 32 serial ultrasonic store tanks, each with 16 words and having one line for each word. The presence or absence of a dot indicated a "1" or a "0." The program tape was punched twice by a typewriter-like device.

To ensure the program was punched correctly, a "comparator" machine read two tapes and stopped if there was a discrepancy. The program queue was simply the yard-long tapes clipped to a hook, Wilkes explained.

### Initial Response

Mead told the audience that initially few people in the computer industry were very impressed by putting circuits on silicon, but then as the complexity increased, they decided designer Bob Noyce was up to something.

But memory circuits were thought of as semiconductor devices and people didn't always understand the use of functions, he said.

"Those working on silicon saw trees, not the forest," Mead commented as he stressed that even a full-blown computer is nothing more than a component to an applications solution.

The technology soon passed the initial limits, and 10 years ago engineers knew enough physics to predict that it was possible to build a device with wire widths 10 times thinner than today's devices, based on the fact that the wave length of light is .5 microns.

Citing work on devices with a .24-micron lines, Mead concluded that "if it's possible to do the thing physically, it will be done."

With thin lines, the time scale decreases linearly and the power required decreases by either the cube or square, so a device 10 times smaller gives anywhere from 100 to 1,000 times more computing power per kilowatt, he said.

### Moore's Law

Gordon Moore's law that the complexity of chips doubles every year seems to lose confidence past the last data point, he observed, adding mankind is usually overly optimistic in the short term and pessimistic in the long term.

Asking what the industry has had to learn to arrive at nearly one million devices per chip, Mead quickly reviewed the evolution to circuit and then logic design, to machine organization and to systems architecture.

Machine organization was interesting because although the microprocessor was a good idea, people had "to wade through past rubbish to figure what they were doing."

The microprocessor was "a mechanism for setting the industry back 10 years because it diverted management attention from the fact that the microprocessor is only part of the bag of tricks of implementing a system," Mead added.

### Systems Architecture

Systems architecture is where the action is now, with the problem of dealing with lots of microprocessors instead of one, Mead noted.

A watershed advertisement in the industry was that for Intel Corp.'s 4000, which cited "a new era of integrated electronics."

What used to be two industries were then on a collision course, with computer scientists learning the implications of using silicon and silicon people learning to design systems, Mead said.

Recently, the two industries have discovered they are really in the same business. "Chips are systems — and systems are chips," the speaker pointed out.

### Basic Problem

But microprocessors have not solved the basic problem. "We need to do a function and no manufacturer can put all your needs on a chip as he can't know what your needs are," Mead noted.

There still is an immense amount of "glue" in the form of support chips necessary; memory, programmable read-only memory and microprocessors normally consume only one-quarter of board space and power in a system, he said.

"There isn't any panacea, but there are a lot of bandwagons," he observed.

One of the latest is gate arrays. We have to face the fact that LSI is here to stay, and all digital electronics ends up on silicon, he commented.

The custom-vs.-standardized issue arises constantly. Sometimes, Mead said, it is easier to design a chip that does the required functions than to integrate the pieces.

*Upton is editor of "EDP Industry Report," an International Data Corp. publication.*

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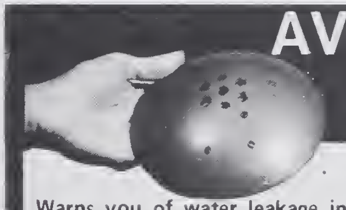
# Vendors Invited To AIM Meeting

CHICAGO — Vendors providing services to financial institution data centers can participate for the first time at the annual meeting of the Association of Information Managers for Savings Institutions (AIM).

According to AIM, close to 200 data centers servicing approximately two-thirds of the nation's savings and loan institutions will be represented by their senior executive officers at the conference to be held Oct. 18-22 on Marco Island, Fla.

The types of vendors specifically being encouraged to participate include equipment vendors, software suppliers, forms dealers, DP consultant services, plastic and COM card suppliers and check printers.

Companies that wish to participate should contact the Executive Director, Association of Information Managers, Suite 2221, 111 E. Wacker Drive, Chicago, Ill: 60601.



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# Supershorts

Microtek, Inc. has announced the formation of a new division, Microtek Peripherals. This division will concentrate on hardware peripherals and software for the Atari 400/800, Apple II and TRS-80 computer systems.

— — —

The recently established Byte Industries, Inc. has reached the 1,000 mark on its list of worldwide customers, with the addition of the Sunset Computers store.

— — —

Signetics Corp. and Fairchild Camera and Instrument Corp. have jointly announced that Signetics has been selected as an alternate source to produce and market Fairchild's Fast line of bipolar logic circuits worldwide.

— — —

Six past presidents of banks within the Multibank Financial Corp. system have written to share-holders expressing their opposition to the attempted Gosman group takeover of Multibank, a registered bank holding company with seven member banks as well as other affiliated divisions and subsidiaries, including those offering computer services, leasing and international banking.

— — —

Digital Equipment Corp. has introduced its Authorized Digital Computer Distributor Program to the UK and the Republic of Ireland.

— — —

Robert A. Coyer, a senior policy official for the General Services Administration's Automated Data and Telecommunications Service, has been named a vice-president of the Computer and Business Equipment Manufacturers Association. He will have primary responsibility for the association's telecommunications and tax policy programs.

— — —

Data General Corp. has established a nationwide manufacturers' representative network to market its microchip and single-board level computer products and the signing of agreements with nine manufacturers' representative organizations.

— — —

Cincom Systems, Inc. has entered a multiple unit license agreement with Lloyd Bush and Associates. Under the agreement, Lloyd Bush will offer its financial modeling system, Model, in conjunction with Total, Cincom's data base management system, for Prime minicomputers.

— — —

Microdata Corp. has established an independent sales organization department.

— — —

Memorex Corp. and Dainippon Ink and Chemicals of Japan have formed a joint venture in the office machine supplies field. Under the agreement, Memorex transferred its Word Processing Supplies Division to the new corporation. Dainippon purchased a 43% interest in the new venture called Memorex DIC Corp.

— — —

OKI Semiconductor, Inc. has entered the U.S. market for advanced memories with its 64K-bit random-access memory — the MSM 3764 — which it is offering in three speed versions: a 200nsec, 150nsec and 120nsec device.

## March Show Set for Paris

PARIS — "Printemps Informatique 81" is the name of the annual electronic data processing exhibition taking place here March 24-27. Show sponsors at the Bureau International for Public Relations are promising American manufacturers of computer hardware a receptive audience.

Originally, conceived and supported by the U.S. Embassy in France, the four-day event is structured to appeal to overseas American OEMs. Last year's exhibition drew almost 100 exhibitors and 5,000 attendees.

Full details on participation in Printemps Informatique in Paris is available from Gerald G. Kallman at Kallman Associates, 30 Journal Square, Jersey City, N.J. 07306.

## Cite Expo Set For June 24-26

ATLANTIC CITY, N.J. — Computer Industry Trade Expo (Cite), to be held here June 24-26, will feature micros and mainframes, peripherals and software.

Space applications and brochures describing the show have been distributed and the Conference Management Group, a division of CW Communications Inc., will produce the seminar program.

The show is sponsored by the Microcomputer Industry Trade Association (Mita) and produced by Little Brothers Shows, Inc. H.A. Bruno, Inc. will manage the exposition.

More information is available from Mita at 110 Charllote Place, Englewood Cliffs, N.J. 07632.

Contract Personnel Services, Inc. has changed its name to Commercial Programming Systems, Inc. CDP Services, the holding company that owns Commercial Programming Systems, is now called Aldam Industries, Inc.

— — —

Paul E. Scheffel has been named to manage the expanded manufacturing standards program announced recently by the Semiconductor Equipment and Materials Institute in Mountain View, Calif.

— — —

Dr. Kenneth E. Batcher has been awarded Goodyear Aerospace's Dr. Karl Arnstein Award, its highest honor for technical achievement.

— — —

Data General Corp. has announced that all litigation between it and SCI Systems, Inc. has been settled. The terms of the settlement are confidential, but call for the dismissal with prejudice of all claims asserted by either party against the other. The litigation concerned antitrust and trade secret claims asserted by the parties relative to computer products.

— — —

Anacomp, Inc. and the Dun and Bradstreet Corp. announced that their discussion relating to the possible acquisition of Zytron Corp. by Anacomp has been terminated.

— — —

BSL Technology and Computer Sciences Corp. have agreed in principle on the joint development of a laboratory computer system for use with CSC's hospital information system called Infocare.

— — —

Honeywell, Inc. has established a multimillion-dollar Software Development Center in Toronto.

— — —

Industrial Micro Systems has changed its name to IMS International. IMS International is relocating its manufacturing and administration from Orange, Calif. to Carson City, Nev.

— — —

CPT Corp., the Minneapolis-based manufacturer of word processing systems, is negotiating to lease a facility in the Republic of Ireland to expand production of its product line.

— — —

Omron Electronics, Inc. has formed a Retail Systems Division.

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## Orders & Installations

Albany Medical Center in Albany, N.Y., has ordered an automated radiology computer system called Mars II from Mid-Continent Computer Services, Inc.

The University of North Carolina has placed an order for 22 Model CM9100 statistical multiplexers from the Data Communications Division of Digital Communications Corp. The multiplexers will be used in the University's Computation Center and by the Administrative Data Processing Department.

Stewart, King & McKenzie, a wholesale foods distributor in Selma, Ala., has ordered a System 80 computer from Sperry Univac to be used for inventory control, billing and a buyer's information system.

## Contracts

Timberline Systems, Inc., an Oregon-based software firm, has signed an OEM agreement with Applied Digital Data Systems, Inc. (Adds). Timberline is now the exclusive distributor of the new Adds Regent 40T remote terminal, which will provide the user with access to a Texas Instruments, Inc. DS990 central processor from any external site linked by telephone to the host computer location.

Leading Edge Products, Inc. of Canton, Mass. has signed a $6 million agreement with C. Itoh Electronics for Starwriter fully formed character printers.

General Dynamics of St. Louis has signed a $5 million corporate material agreement with Harris Corp.'s Data Communications Division for 45 1600 remote batch terminals and distributed data processing systems.

## Nickels & Dimes

Gerber Systems Technology, Inc. a subsidiary of Gerber Scientific, Inc., has filed a registration statement with the Securities and Exchange Commission providing for an initial public offering by Gerber Systems Technology of 600,000 shares, or approximately 20% of its common stock.

$$$

Interaction Systems, Inc. has filed an amended registration statement with the Securities and Exchange Commission for a proposed public offering of a new issue of 500,000 shares of its Class A common stock. The amended registration statement enlarges the proposed offering from 250,000 shares to 500,000 shares.

$$$

Kidder, Peabody & Co., Inc. heads an investment banking group that is publicly offering one million shares of common stock of Dataproducts Corp. at a price of $33 per share. Proceeds from the sale will be used to repay outstanding short-term debt previously incurred to finance capital expenditures and increased working capital requirements.

$$$

Comserv Corp. plans to file a registration statement for a public offering of 300,000 shares of its common stock. The proceeds will be used to increase working capital.

$$$

AM International reported a loss of $6.9 million or 82 cents per share for its second quarter, compared with earnings of $262,000 or 3 cents a share in the same period last year.

$$$

Spectra Logic Corp. has completed arrangements with the Metropolitan Banking Department of Crocker Bank for a three-year, $750,000 revolving line of credit. The credit agreement will allow the company to finance the increasing shipments of its broad line of multifunction, emulating single-board controllers.

## Expansions

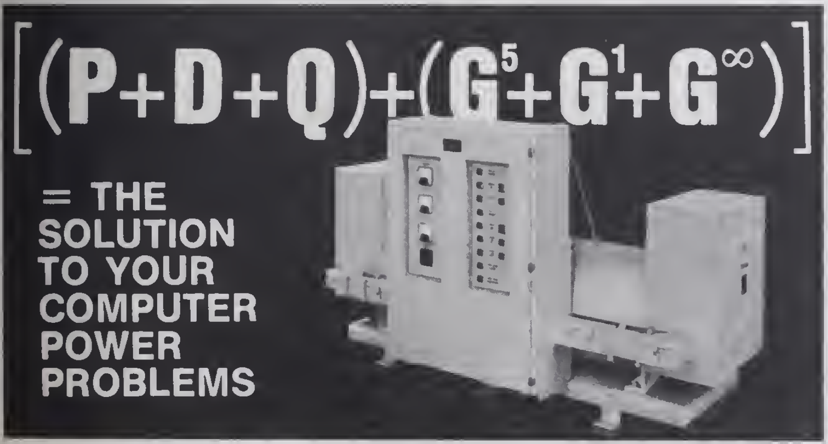
National Semiconductor Corp. has announced plans to build a new plant in Tucson, Ariz., for further expansion of its military and aerospace products business. Construction on the 86,000-square-foot building is scheduled to begin in July.

I.P. Sharp Associates has expanded its branch network by opening offices in Madrid, Spain; White Plains, N.Y.; and San Jose, Calif. in early 1981.

Transcomm Data Systems, Inc. has moved to larger headquarters to accommodate clients in the New York, New Jersey and Connecticut area. The office is located at 65 Livingston Ave., Roseland, N.J. 07068.

Lobo Drives International has moved to larger facilities in an effort to better meet customer needs. Its address is 354 S. Fairview Ave., Goleta, Calif. 93117.

The Kennedy Co. of Monrovia, Calif., has recently completed a $1 million-, 22,000-square-foot production facility for its line of 14-in. and 8-in. Winchester disk drives.



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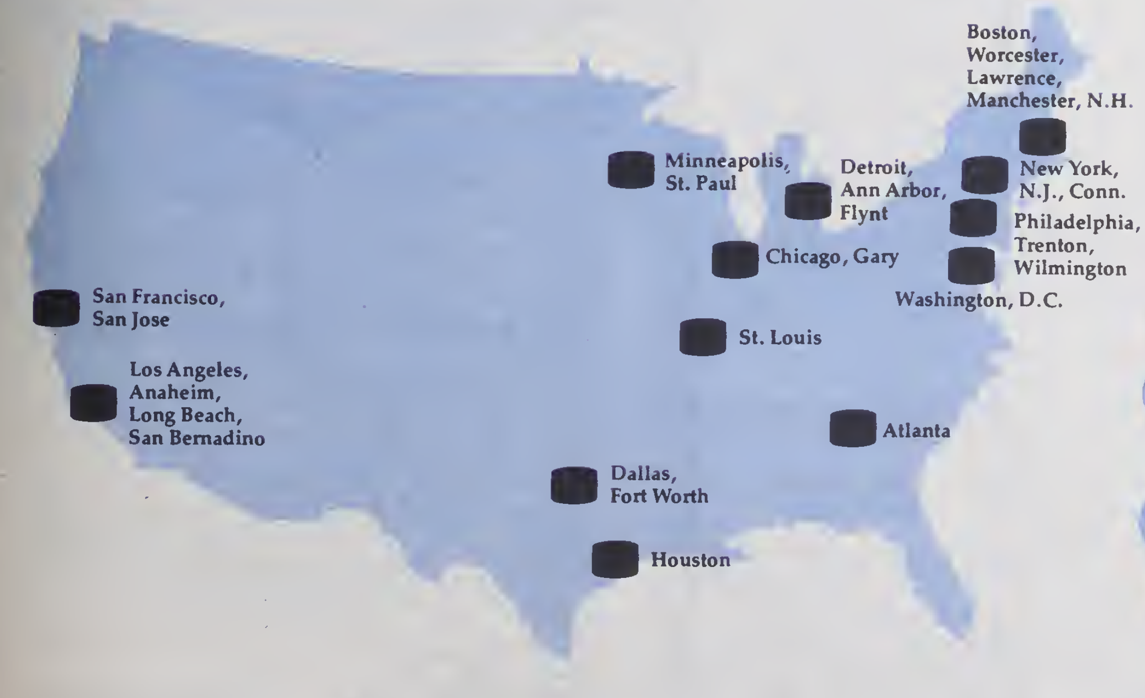
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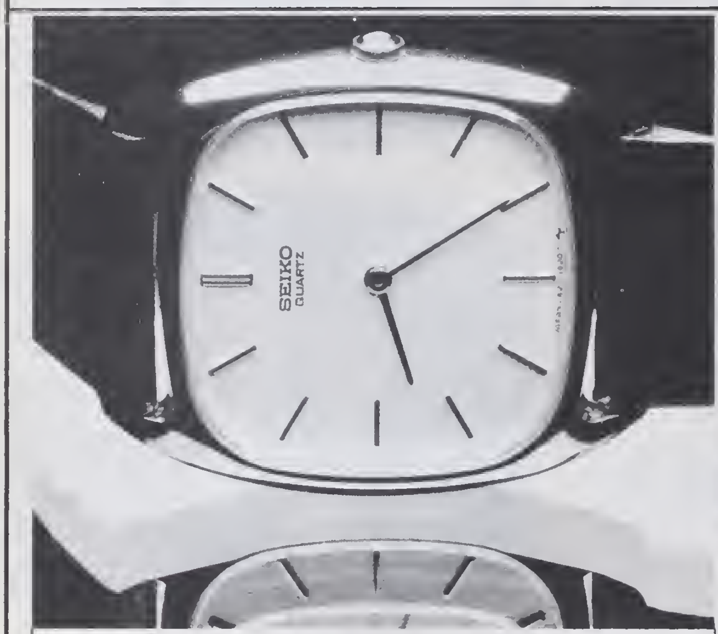

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### Arizona

**Senior Analyst—Banking Applications.** Leading Arizona financial institution seeks a professional to assume full responsibility for project definition, planning, scheduling, resource management and final implementation. Excellent visibility to executive management. Position requires extensive banking knowledge, management skills and familiarity with large-scale IBM data base oriented systems. To $33,000.

**System 34 Data Processing Manager.** Growing manufacturing firm in smaller Arizona community provides a ground-floor opportunity to build a staff and develop the data processing function. Proven leadership and technical skills including RPG II required. To $28,000.

**Systems Analyst—New Corporate Subsidiary.** Recently formed subsidiary of a prestigious Fortune 500 corporation seeks an Analyst to assist in the development of its first data processing systems. Position provides exposure to the corporate state-of-the-art data center, yet offers the benefits of a small, well-organized company. Solid background in COBOL, structured design techniques and previous system design responsibilities required. Phoenix location. To $30,000.

**Minicomputer Systems Programmer.** Phoenix based firm seeks an individual with extensive DEC PDP/11 software background to assume complete responsibility for system integrity, performance, generation and maintenance. Knowledge of minicomputers in a distributed processing environment preferred. To $31,000.

**Consultants—National CPA Firm.** The Phoenix branch of a well-recognized CPA firm is expanding its MAS Consulting Group and seeks computing professionals with extensive business systems design experience and familiarity with a wide variety of large and small systems hardware. To $35,000

**Systems Engineer—Dual Career Path.** Computer hardware vendor who ranks among the leaders in DDP and data communication hardware seeks an Analyst to join its Phoenix office staff. Knowledge of several high level languages, data communications concepts and minicomputers is desired. Position offers exceptional growth opportunities in either technical or marketing ranks. To $18,000.

**Process Control Systems Programmer.** Prestigious computer hardware manufacturer seeks an experienced real-time Programmer Analyst to participate in the development of P/C applications for the petrochemical and utilities industries. Extensive Assembler and FORTRAN, engineering orientation and excellent oral/written communication skills required. Southern Arizona location. To $36,000

**Real-Time Programmer Analyst—Graphics Software.** Growth-oriented service firm seeks a professional to join its consulting staff, which provides software development for a wide variety of engineering firms. Position requires expertise in Assembler Language and previous experience in graphics or automated drafting systems. Moderate travel provided. Southern Arizona location. To $24,000

**Programmer/Analyst—On-Line Systems Development.** Growing Phoenix manufacturer seeks a professional to assist in the development and installation of a totally on-line manufacturing and financial control system. Training in data base and data communications systems provided. COBOL and knowledge of virtual operating systems required. To $25,000.

**ALC Programmer/Analyst.** Corporate Data Communications Group of a Phoenix based Fortune 500 company seeks an individual to participate in the development of sophisticated remote teleprocessing systems using VTAM, CICS, IMS/DC and IBM 3033's under MVS. Company offers extensive formal training in both technical and personal development areas. To $28,000.

**MVS Systems Programmer.** Nationally known Phoenix organization offers challenging position with responsibility for MVS performance evaluation, hardware evaluation and planning, extensive TP network design and training of junior staff members. Obvious technical background required, with preference for those with proven leadership abilities and a desire for future management responsibilities. To $35,000.

**Sales Representative—Software.** Well established national software firm seeks an individual to sell proven software products in the Arizona and New Mexico area based out of Phoenix. A proven record of success in software package sales is preferred but time-sharing, hardware or service bureau background acceptable. No territory reductions or limit on earnings. Base to $22,000; $50,000 at 100%.

**District Manager—New Territory.** Growing young firm seeks a current Sales Representative to open and manage its first district office in the Southwest. Company has doubled its sales annually over the past four years. Product line is in the fastest growing segment of computer products. Phoenix location. Base to $25,000. Estimated first year earnings to $50,000.

**Systems Manager—On-Line Development.** Suburban Phoenix organization offers an exceptional opportunity for a professional with previous project management experience to direct the development of new on-line financial systems. Strong project control techniques and communication skills required. To $30,000.

**Systems Analyst—Distribution or Financial.** Major division of a Fortune 500 corporation seeks an experienced Analyst with at least three years experience in distribution and/or financial information systems. Large systems environment exposure preferred. Arizona location. To $34,000

**RPG Programmer—Learn COBOL, CICS.** Phoenix organization seeks a professional with solid RPG programming skills to assist in the conversion to a larger computer system. Broad business applications exposure preferred. Training provided in COBOL, CICS and data base. To $21,000.

**Programmers—HP 3000.** Major Arizona organization is beginning the implementation of HP 3000-based distributed information systems. It offers outstanding internal training opportunities and a recession-proof industry. To $25,000

**Operations Analyst—Distributed Processing.** Phoenix area organization seeks a professional to analyze corporate operations to determine new operating center locations and develop techniques to enhance existing systems. Background should include business degree and operations management experience. To $27,000.

**Minicomputer Specialists.** Communications firm has multiple projects for mini/micro Programmers and Software Engineers to develop state-of-the-art communications based systems on microcomputers as front-end vehicles to handle line traffic and support multipurpose communications networks. To $35,000.

### Colorado

**IMS Programmer Analysts—New Data Center.** Denver based division of an international financial firm is creating a new data processing center in Denver. It seeks professionals with two years of IMS applications development experience and a COBOL programming background. Beautiful suburban business park environment. To $25,000.

**RPG II Programmer Analyst.** Energy firm located in a small Colorado mountain town close to skiing and other outdoor recreation seeks a professional having a minimum of two years RPG II experience. Rapidly growing shop offers advancement opportunity. To $20,000.

**DDA Programmer Analyst.** Major Denver bank in the process of evaluating new banking packages seeks an individual with two years OS COBOL background and DDA knowledge. Will modify existing programs or develop new DDA system. To $23,000

**Junior Consultant.** National consulting firm seeks a degreed professional having a broad background in programming and analysis for its Denver staff. Advancement to Senior Consultant within two years. To $23,000.

**Assistant General Manager.** International services firm seeks a seasoned data processing executive with a strong, current technical background and on-line systems experience. Banking/financial background highly desired. Denver location. To $35,000

**Customer Applications Analyst—Time-Sharing.** Denver based time-sharing firm is expanding its branch staff and seeks persons with two years of FORTRAN or BASIC exposure involving engineering or business applications. Dual career path leading to sales or technical support management. To $23,000.

**Programmer Analyst—Consultant.** Turnkey software firm with international client base seeks a marketing-oriented Programmer with two years RPG, COBOL or BASIC experience. Some overseas travel provided as member of a support team. Denver location. To $20,000.

**Data Processing Manager.** Medium sized Denver firm seeks a Manager with a strong knowledge of manufacturing systems. Experience with minicomputer hardware evaluation, structured design and financial management practices preferred. Compensation includes stock options. To $35,000.

**Programmer Analyst—New CICS Development.** Headquarters of a major division of a national firm moving into a new Denver data center seeks a professional with two years OS COBOL and CICS experience for extensive new systems development projects. To $25,000.

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**Mini Programmer—Real-Time Graphics.** International Denver based OEM firm seeks a professional with two years real-time FORTRAN or Assembler experience to work on leading edge interactive graphics software. Future projects include sophisticated numerical control and energy exploration applications. To $26,000.

**Scientific Programmer Analysts.** Multiple positions exist for Programmers having a minimum of two years FORTRAN or PL/1 experience. Energy applications experience and familiarity with COBOL highly desired. Positions involve association with a Denver suburban organization installing a new IBM 3033 MVS system at its expanding corporate data center. To $25,000.

**Sales Representatives—Time Sharing.** Highly respected national computer services firm with well-established Colorado customer base seeks marketing professionals having at least one year experience in any DP sales activity. Anticipated first year earnings to $35,000.

**Minicomputer Software Programmer—New Development.** Two years Minicomputer Assembler qualifies you for a chance to be a part of a team involved in the development of operating systems and compilers. This prestigious firm consults with major firms nationwide providing custom software development. To $24,000.

**FORTRAN/Mine Engineering.** High growth energy firm seeks individual with two years of FORTRAN and mine design experience to work with geologists in modeling and simulation of coal mines. High visibility position with excellent potential for advancement to Group Leader. To $32,000.

**FORTRAN Programmer—Energy.** Major oil company seeks minimum of one year FORTRAN programming experience. Process control and DEC PDP exposure helpful. Excellent career growth potential. To $24,000.

**BASIC Programmer.** Minimum one year experience as Programmer Analyst in BASIC, preferably in a small or medium scale hardware environment, qualifies you for a position in a growing manufacturing organization. Unique chance to move into a Senior Programmer position with systems responsibility. To $20,000.

**Systems Analyst—Banking.** New electronic banking department of a large Denver bank is automating various manual systems and seeks a professional with bank operations knowledge and programming background to work with user departments. To $23,000.

**COBOL Programmer—Burroughs.** Exciting opportunity for a professional with one year COBOL in a Burroughs medium systems environment to be involved in the development of new financial systems in a new Colorado growth industry. To $16,500.

**Western Slope—Consultant Programmer Analyst.** Successful business systems development firm in Western Slope recreational area seeks an individual with one year COBOL or BASIC experience and good user interface skills. Knowledge of FORTRAN, DIBOL or experience on PDP/11 is desirable. To $20,000 plus incentives.

**Programmer Analyst—Formal Training.** International computer hardware manufacturer has multiple openings for Programmer Analysts with a minimum of two years COBOL on IBM, OS or DEC environments. This Fortune 500 company has an excellent internal training program. To $35,000.

**COBOL Programmers.** This prestigious international Fortune 100 company, located in a beautiful mountain town, seeks Programmers with a minimum of two years IBM COBOL experience. Company benefits include company subsidized vacations and ski trips. Excellent relocation package provided to this low cost of living area. To $26,000.

## New Mexico

**Scientific Programmer.** New Mexico mining firm seeks aggressive, technically-oriented individual with expertise in mathematical analysis and financial simulations. Large-scale hardware and FORTRAN experience required. To $30,000.

**Junior Programmer Analyst.** Progressive New Mexico hospital offers an exceptional opportunity in the development of patient care and administrative systems. Will consider as little as six months experience. Prefer exposure to both COBOL and Assembler Language. To $18,000

**Systems Programmer.** Leading New Mexico firm has created a new position requiring expertise in standards development, hardware/software evaluation and systems tuning, 370/DOS/VS. Excellent benefits. To $28,000.

**Resident Systems Engineer—Minis.** Leading minicomputer firm with major client in Albuquerque area seeks a Systems Engineer with strong FORTRAN and Assembler Language experience on mini systems. To $27,000.

**Systems Programmer—Mainframe Vendor.** Dominant vendor in large-scale mainframes offers a key position for a highly technical person having solid experience in OS/MVS internals. Albuquerque suburban location. To $35,000.

**Minicomputer Marketing Representative.** National minicomputer organization with high performance, easy to install hardware seeks a marketeer having previous hardware, software or services experience for its Albuquerque area office. Estimated first year earnings to $45,000.

**MIS Director.** Fast growing diversified Albuquerque company in the direct marketing field seeks an individual to manage all data processing functions. Position reports directly to the CEO. To $40,000 plus bonus and profit sharing.

**Engineering Analyst.** High technology New Mexico based firm seeks an Engineering Programmer with strong background in FORTRAN, minicomputers and graphics development. Degree in Engineering preferred. Requires light travel and extensive interface with non-D/P personnel. To $27,000.

**Operations Supervisor.** Albuquerque organization seeks a professional with five years experience in the operation of a medium-sized computer installation. Will supervise twenty people and interface with corporate management. To $23,000.

**Data Base Analysts—Low Cost of Living.** Organization located in a highly desirable smaller community seeks professionals to staff its newly created formal data base function. One year experience with IMS, TOTAL, IDMS or other data base management system required. To $27,000.

## Utah

**Audit Programmer Analyst.** If you have two years of IBM COBOL, our client offers a unique opportunity to move into EDP auditing with a major financial institution located in Salt Lake City. To $20,000.

**Real-Time Software Programmer.** Major software development company in rural Utah has a long-term contract to develop real-time graphics software systems. Mini or micro Assembler experience required. Exposure to Avionics preferred. To $30,000.

**PL/1 Programmer—Learn IMS.** Progressive Utah energy firm seeks professionals with one year of PL/1 programming experience. Excellent training program offers chance to learn IMS, DL1, TSO. To $19,000.

**Mini FORTRAN Programmer Analyst.** Join this highly technical firm situated at the western foot of the Waspatch Mountains. Qualified candidates should have mini FORTRAN experience in a real-time environment. To $32,000.

**Senior Engineering Analyst.** Leading firm in real-time process control and material handling systems seeks a degreed professional with one to six years of software experience on PDP-11/RSX 11-M or IBM Series-1. Excellent opportunity to use military or aerospace background and move to private industry. Salt Lake City location. To $30,000.

**Manufacturing Programmer/Analyst.** Expanding division of international firm in Utah seeks a Programmer Analyst with three years of RPG II experience. Duties involve heavy new systems development involving 60% analysis and 40% programming. CCP or IPICS exposure desired. To $25,000.

**IMS Programmer Analyst.** Participate in the development of applications supporting the largest privately financed construction project in the United States. Candidates should have OS COBOL and IMS on-line experience. Excellent benefits including relocation. To $27,000.

**Systems Programmer.** This fast growing company located in Salt Lake City is seeking an individual with a minimum of two years VM/CMS or VS1 Systems Programming. CICS experience is preferred, but not required. To $28,000.

**OS Analyst/Programmer—Learn CICS.** Established but growing insurance firm has just installed CICS. It will train a professional in CICS with a minimum of three years of OS ALC or COBOL experience. To $26,000.

**Programmers—Telecommunication Training.** Salt Lake organization with national network tied into large-scale Burroughs hardware seeks a current Programmer with a minimum of two years Burroughs COBOL experience. Extensive in-house training provided in this state-of-the-art environment. To $25,000.

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Responsible for analysis of communications problems between IBM and DG equipment. Will write detailed program specifications for programming staff and design access and inquiry language for system user as well as supervise programmers. Experience must include 5+ years in TP including CICS and directly related experience in graphics system design.

## SR. ANALYST/ Graphics

Responsible for design and specifications for automatic graphic generation procedure and Command language interface to system user. Experience must include 4+ years with DG equipment designing graphic systems. AOS and FORTRAN experience very desirable in addition to experience in TP environment.

## PROGRAMMER/ANALYST/ Graphics

Will write, debug and implement programs for operation of DG equipment. Will create final program and user documentation. 4+ years computer generated graphics background using FORTRAN on DG equipment.

## PROGRAMMER/ANALYST/ Teleprocessing

Will write, debug and test on-line modules running on IBM and DG equipment, create final program and user documentation. 3+ years experience with CICS, 3270s, IBM ASSEMBLER and VS-1/OS.

## PROGRAMMERS

Openings exist for individuals to code, debug and test statistical and off-line graphic modules and set up backup systems. Will aid in development of graphics system and system maintenance. 3+ years IBM ASSEMBLER and COBOL. Familiarity with IBM VS-1/OS.

System development work will be done at our headquarters location in Cupertino, CA for approximately 6 months minimum. Attractive relocation benefits are available during this period.

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**Please send resume (salary history required) to Harry T. delk, Director of Personnel, (Dept. CW1) SYSOREX INTERNATIONAL, INC., 10590 N. Tantau Ave. Cupertino, CA 95014.**

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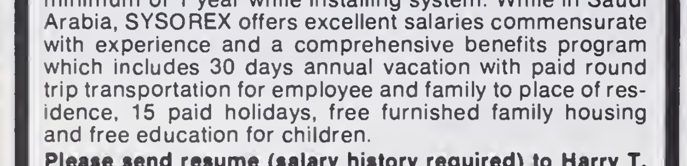

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| SYSTEMS ANALYSTS - Mfging or Financial design | To $34K |
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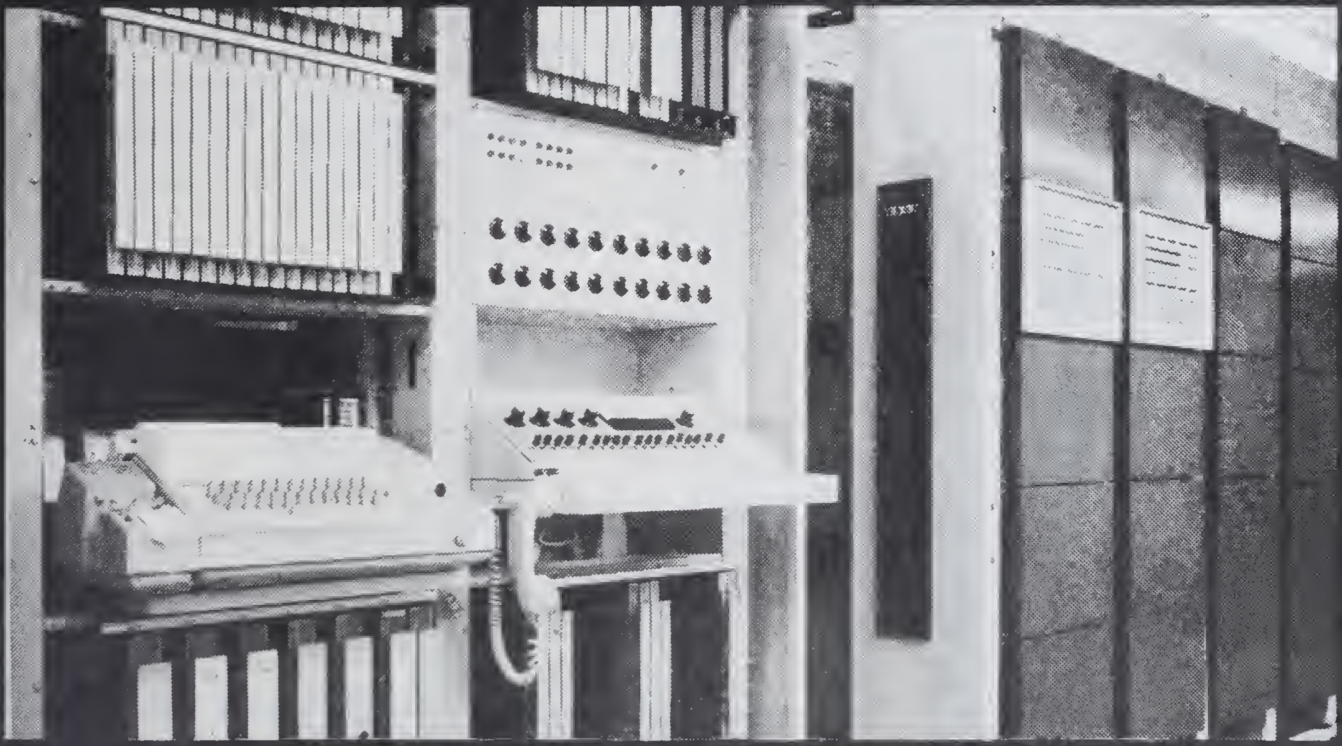

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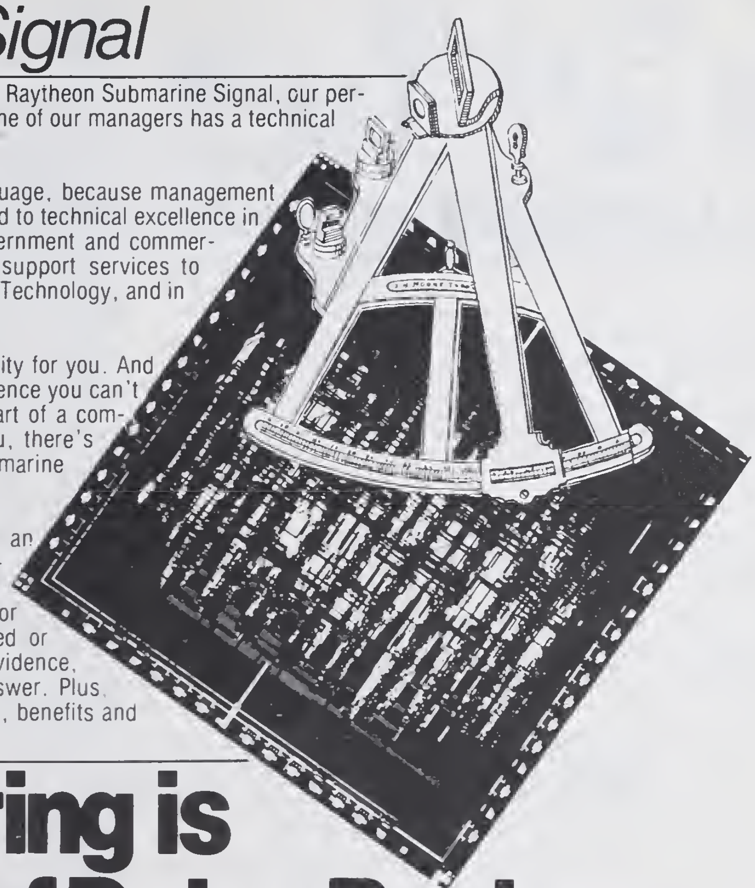

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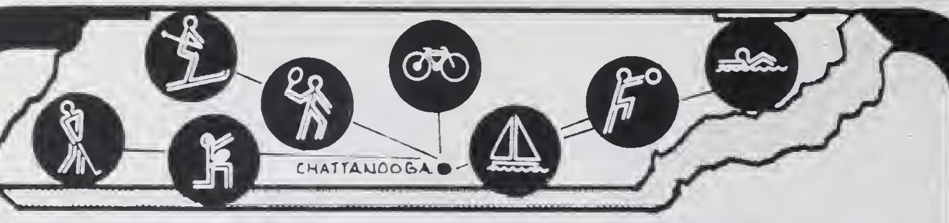

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**Our plans for the 80's include:**

- evolving from an RJE-BATCH operation to an On-line interactive data base environment.
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- upgrading of all applications to use state-of-the-art hardware and software technology.

Our tools include: Twin large IBM main frames running VM/370, CMS, DOS/VS, DOS/VSE, CICS/VS, VSAM, DL/1, COBOL, PL/1, VTAM, and NCP. Our application software includes: SHAS, PCS, MSA financial software.

If your experience includes hospital information or other financial applications and/or familiarity with any of the above tools, you could be qualified to join our talented professional staff.

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NCR Comten is searching for highly motivated marketing representatives to market our innovative computer data communications products. This unique opportunity is available to skilled sales representatives in search of an aggressively expanding industry leader (NCR Comten has enjoyed 43% annual growth for 7 years).

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## SYSTEMS PROGRAMMERS

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Provide system support for 3 DEC PDP-11 systems using RSTS/E and RSX-11M, and communicating to a DEC-10.

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Provide system support for an IBM 370 system using OS/VS1 and VM/CMS.

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## SYSTEMS ANALYST

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**Programmer** - Working knowledge of Cobol and Assembler, 3-6 years of EDP experience, knowledge and/or experience with Easytrieve, VSAM, DOS/VSE, Database. CICS experience is required.

**Programmer** - Two of four years experience with working knowledge of Cobol. Knowledge of DOS/VS JCL, Assembler, RPG 11, Easytrieve. Design and Database experience helpful.

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## SENIOR SYSTEMS ANALYST

The ideal candidate will have 3-5 years of minicomputer applications analysis and programming experience in a bank/brokerage environment. Responsibilities include preparing detailed design and programming specs for advanced securities processing and Portfolio Management systems. Prior systems experience required.

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In addition to interfacing with outside vendors and in-house users, the selected applicant MUST have 3-5 years of minicomputer operations experience including supervisory responsibility. A BA degree is required. Salary to $28,000.

*In return, we will offer qualified candidates a comprehensive benefits program which includes 100% tuition refund.*

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Carnegie-Mellon University is embarking on a program which will make computing the central resource for scholarship, instruction, and administration. Already a leader in university computing, CMU will develop a network of personal computers for faculty, staff and students. Experienced, dedicated and creative managers are needed to lead this major expansion and innovation. Communications skills will be vital.

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Responsible for leading the academic computing effort. Will be expected to work with faculty to expand the use of computing for instruction and research. Responsible for administration of the Computation Center. Will be expected to manage a major expansion of computing facilities including implementation of a high speed data communications network and addition of several thousand personal computers. Several years management experience in a large scale computing facility essential - experience in an academic environment desirable. Advanced degree or equivalent experience and sound technical background in computing required.

### Director of Administrative Systems

Responsible for leading the administrative computing effort. Will be expected to support the university administration through implementation of a distributed management information system. Responsible for management of the administrative systems staff. Will work closely with Director of Academic Computing to provide faculty and students access to information in support of instruction, research and campus affairs. Responsible for integrating administrative use of comprehensive text processing and office management facilities. Substantial management experience in administrative computing required, including a robust background in the management of software development projects.

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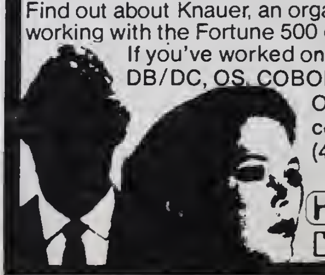

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The ideal candidate has a Bachelor's degree with a minimum of eight years EDP related experience and at least four years of full-time programming/analysis experience. You'll have also participated as a project or team leader in the evaluation, design and implementation of at least two EDP systems, and have a good knowledge of all EDP activities. EDP quality assurance or EDP auditing experience is highly desirable for this position. Experience with Systems Development Methodology a plus.

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# RPG II

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**Systems Analysts**
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Large, rapidly growing retail firm. (NYSE) seeks experienced professionals to fill growth positions in our data processing department

Experience in retail, POS, or Datacommunications would be considered a plus.

Our current environment includes IBM 4331 Mod. 2, S/34, S/3 15D, DOS/VSE, CICS, VSAM

Please call or send resume to
**Family Dollar Stores, Inc.**
**P.O. Box 25800**
**Charlotte, N.C. 28212**
**Attn: Human Resources Dept.**
**(704) 847-6961**
EOE, M/F

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# PHILADELPHIA

## MANAGER TECH SUPPORT TO 37K

Major baNk in NE PA reqs Knlg MVS, ON-LINE, DATA BASE, IMS++ Exp w/telecommunications hardware & software Understand VTAM, SDLC protocol VERY SECURE. IMMED INTV. (ALWAYS FEE PAID)

CONTACT: **Bob Greenberg**

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2000 Market St., Suite 708
Philadelphia, PA 19103
(215) 568-4580

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# Design Engineer
## Computer-Aided Design

Conduct comprehensive study of Oregon Saw Chain Division needs for computer-aided design and computer-aided manufacturing leading to the design of a system for a five-year growth plan selection of vendors and plan for implementation. Implement the plan by training the users, overseeing the system's application, including establishing standards, measuring its productivity, file management, interaction with existing data basis, and speciality programming. Supervise the project to meet schedule and project goals and coordinate with the affected groups within OSCD. Direct engineering support groups and purchase materials to meet project goals.

### Requirements!

MME or equivalent with emphasis on computeraided design and computer-aided manufacturing; experience with CAD and CAM processes and applications; knowledge of computer systems including data base management, system design integrating hardware and software to utilize information from CAD and CAM; understanding of interrelation and network or computers within a system in order to utilize CAD and CAM and practical knowledge of production processes and automatic machinery.

Will work in modern offices with the latest equipment in connection with large international manufacturing firm. Forty hours per week, $2,100 per month. **Send resumes to Omark Industries, Oregon Saw Chain Division, 4909 International Way, Milwaukie, OR 97222, Attention: Dick Lindsay, Director of Personnel.**

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M. David Lowe has been retained to staff the largest start-up operation in data processing history — a major computer center in an overseas location to support a geophysical research and development effort. Top managers have been brought in from around the world, and they are ready to begin selecting a staff that will change the meaning of "stete-of-the-art" software. Consider the opportunities:

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. . . . . Net income after all expenses will be greater than your current U.S. gross income; i.e., if your current base salary is $30,000, you can plan on banking $35,000.

. . . . Includes a 10% cash bonus upon acceptance and a 40% expatriate bonus.

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. . . . 1981 hardware will be twin IBM 3033s, with the five year plan calling for multiple 3081s (unless IBM develops something more powerful).

. . . . Latest generation IBM opereting system.

. . . . Worldwide telecommunication network.

. . . . Largest variety of geophysical and petroleum engineering development projects in oil industry history.

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. . . . Forty days vacation the first year, plus a tax protected trip to your point of origin. The time and money can be used to see Europe, Africa, the Far East.

. . . . If you are married, but elect to go single status, the company will give you three tax sheltered trips home each year.

### LIVING CONDITIONS . . . .

. . . . Family or single status American-style living.

. . . . First rate hospital accredited by the North American Hospital Association.

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. . . . Schools that produce an average score in the 90th percentile on U.S achievement tests.

With infletion end recession outpacing your salary increase 2:1, why not consider interviewing on a position that can meke you financially secure for life in just a few years. We currently have openings in the following areas for unit supervisors, project managers, project leaders, senior analysts, and technicians.

**GEOPHYSICAL APPLICATIONS.** Positions for programmers through project managers in the areas of seismic edit, statics solution, CDP, velocity analysis, deconvolution, migration, stack, pre-seis, and de-multiplex/correlation. All systems will be done in FORTRAN or PL/I on IBM hardware.

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**SYSTEMS PROGRAMMING.** Opportunity to participate in the installation and development of the most technologically advanced system ever put together. Openings for MVS, VTAM, TSO, and IMS systems programmers

**DATA BASE ANALYSTS.** IMS development for maintenance of a huge amount of geophysical data. Will be using IMS 2.0 as soon as it is released

**EDP PLANNERS.** Responsible for instellation and facilities planning, contracts control, staff education, and service-level monitoring

All inquiries will be treated with the confidentiality and professionalism that you deserve. For further information contact Cliff Reilly at (713) 445-6464 or Ron Timm or Roger Hall at (713) 658-9898.

## ALL FEES ASSUMED BY CLIENT COMPANIES NEVER A CONTRACT TO SIGN

Please submit salary history with your current resume

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# SYSTEMS PROGRAMMER III

**Salary $23,164 - $29,676**
**Depending on experience.**

The University of Washington is seeking a senior systems programmer with Burroughs large systems experience to perform general operation system software development and support. Knowledge of ALGOL, COBOL, DMS-II, and NDL is required. Opportunities exist in data communications hardware/software research and development. Liberal benefits package. Officiel University of Washington application must be received by 5 p.m. or post marked by midnight Monday, March 30, 1981.

**The University of Washington**
**Staff Employment**
**1415 N.E. 45th Street**
**Seattle, WA 98105**
**(206) 543-6969**

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# COMPUTER SCIENCE FACULTY POSITION

## Carroll College Waukesha, Wisconsin

Tenure track position et the renk of Assistent Professor. Advanced degree in Computer Science or releted eree required. Starting date: Sept., 1981. Salery is open and competitive. Duties include teaching of 3 courses e semester, some reseerch, advise students, and serve on college committees. Ability to instruct in some of the following is essential: Dete Structures, Programming Languages, General Computer Architecture, Operating Systems, Artificiel Intelligence, or Graphics. Practical experience would be en esset.

Cerroll College is en equal opportunity employer. Before April 10 send letter of applicetion, resume end 3 letters of recommendetion to **Dean Charles F. Calkins, Carroll College, Waukesha, WI 53186.**

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# PROJECT LEADER

**Mfg./fin'l. apps. or "Human Resources" bkgrd. qualifies for multi-div. nat. corp. based in Central Conn. Salary to $35,000 (fee paid). Contact Stan Durbas or Paul Meissner.**

**Robert Half of Hartford, Inc.**
111 Pearl Street
Hartford, Conn. 06103
(203) 278-7170
**Personnel Consultants**

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## MANAGER TECHNICAL OPERATIONS

## Alaska Court System

Responsible for design, implementation, operetion and maintenance of all automated systems in court operations including operational and management computer information systems data collection system, statistical reporting system and jury management system. Minimum qualifications are Bachelor's Degree in Management, Information Science, Systems Engineering, or closely related field plus 5 years of increesingly responsible experience in data processing and systems analysis. Court experience preferred. Salary is $48,264. **Submit application to Arthur H. Snowden, II, 303 K St., Anchorage, AK 99501 no later than April 15, 1981.**

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# VTAM

## SYSTEMS PROGRAMMER To $38,000

Major, prestigious medical center in desirable Sou. California location seeks systems programmer to program, develop, and maintain distributed processing network using IBM 3033, CICS/VS and ACF/VTAM. Highly professional environment, superior benefits including 3 wks vacation first year. Reply in confidence to:

**Western Health Resources**
**P.O. Box 48919**
**Los Angeles, CA 90048**
**(213) 855-5529**

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# PROGRAMMER ANALYST

Programmer Analyst with managerial experience. Two to three years programming experience on Burroughs equipment using COBOL, DMS II, and GEMCOS. **Send resume to Dixie Beer Distributors, Inc., 4703 Allmond Ave., Louisville, KY 40209.**

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# MIS Professionals

Racal-Milgo, a world leader in data communications has some excellent growth opportunities in our MIS department.

## Programmer Analysts

Individuals should have 1-5 years programming experience with business applications utilizing COBOL in an on-line database environment. Financial or Manufacturing applications, order entry/billing and UNIVAC 1100 experience desirable.

## Business Systems Analysts

Duties include design of Business systems, whether automated or manual, from the feasibility studies through post implementation audits. This position requires a minimum of 5 years broad systems experience. Sales/marketing/order entry background desirable.

Racal-Milgo offers excellent salaries, complete company benefits including 100% paid tuition, life/medical/dental insurance and one of the most pleasant working environments in South Florida. Please send your resume to: Bruce Czarniak or call (305) 591-5211 (collect) for details and application.

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You now have the opportunity to meet with as many as 15 nationally known "Blue Chip" companies, one at a time, weeks of searching accomplished on one weekend without taking any time off from your present position, there are no fees of any kind. Should you have 1 or more years of experience on/in any of the following:

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- HONEYWELL 6000 SYSTEMS/LEVEL 6/66/40 DUAL/IDS/DM4/COBOL GCOS/GMAP
- UNIVAC 1100 (EXEC 8) OR 90 SERIES (OS/3) OS 1100 OR OS/3 INTERRALS DMS-1100-TIP/CMS/QLP/ASC 11 COBOL
- DEC - PDP 11/23/34/44/45/70 - VAX 11/780 RSX 11M-K RSTS/E - VAX VMS - MACRO - 11, BASIC 2, FORTRAN/ASSEM-BLY LANGUAGE
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Send your resume in confidence to register for this career weekend to:

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# EDP AUDITOR

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Motorola's Western Area Computer Center in Scottsdale, Arizona offers a great combination—an environment of advanced technology in a locale featuring sunshine and numerous recreational opportunities.

### MVS or VM Systems Programmer

Immediate opening for a systems programmer experienced in MVS or VM Internals. Knowledge of JES2 Internals, SMP, systems generations and experience in installing VM preferred.

Our hardware environment is 3 MEG 3033 and 8 MEG Amdahl 470 V/7, both on MVS. An additional 8 MEG 3033 to be installed for VM/CMS.

Motorola's data processing center is an expanding organization offering challenging professional growth opportunities and an excellent benefit package. Qualified candidates should forward resumes and salary history to:

**Dottie Morris, Dept. 1044**

**MOTOROLA INC.**
*Government Electronics Division*
8201 E. McDowell Rd.
Scottsdale, AZ 85252

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# Development Opportunities in Data Communications

### The HP Way: Product-Oriented Development

It's developing state-of-the-art products that makes HP a leader. Our Data Communication Operation develops networking systems for both current and next-generation HP computer products. We're looking for Development Professionals who can contribute creatively in these areas:

**Remote Networks**
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**IBM Communications**

Your background should include a BSCS or BSEE or the equivalent and three to five years experience in data communications or systems programming or hardware design.

The HP Way also translates into a comprehensive program of benefits to all employees. Among these are cash profit sharing, stock purchase plan (up to 10% of salary), basic life and group medical, dental and disability insurance, and retirement plan.

If the HP Way sounds like your way, please send your resume to L. Spatz, Hewlett-Packard Company, Computer Systems Division, 19447 Pruneridge Ave., Cupertino, CA 95104. We are an equal opportunity/affirmative action employer.

**HEWLETT PACKARD**

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## NETWORK SYSTEM ANALYST

*We intend to implement one or more distributed processing networks in 1981, and we need an individual with networking expertise to evaluate potential hardware configurations and supporting communications software. Your recommendations will form the primary basis for determining network strategies. Your background should include:*

- *Network design, installation and maintenance*
- *Monitoring of network performance*
- *Exposure to various TP monitors*
- *IBM hardware and network architecture*
- *Exposure to mini-computer configurations, a plus*
- *DBMS (IMS a plus).*

*Sallie Mae offers a dynamic business environment, opportunities for professional development and an excellent package of employee benefits. Our offices are located in Washington, D.C. in a pleasant Georgetown location. Send your resume in confidence to:*

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### SYSTEMS/ANALYST

Local mfg co needs person with 5+ yrs in DP. Serve as liaison between user and syst personnel. Design of new and maintenance of existing syst progs. Exel ben. **$31K.**

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### COMPUTER OPERATORS

Evangelical Christian Ministry seeks qualified computer personnel who are experienced O/S operators. Mid-size frame running IMS, CICS, MVS, HASP, JESZ, and TSO. Must be experienced in all phases of Operations JCL, Job setup, Procedures, etc. Shift work. If you can qualify, please contact:

**CBN Personnel**
**CBN Center**
**Virginia Beach, VA 23463**
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### COMPUTER DATA PROCESSING

Department Chairman position open July 1 for data processing chairman at private college. Responsible for development and teaching of data processing curricula and computer support services for the college. Master's degree required. Must have broad experience in business data processing. Salary negotiable. **Send resume to: Victor Morris, Ph.D., National College, P.O. Box 1780, Rapid City, SD 57709. Phone 1-800-843-8892.**

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## Product Manager Line Printers & Disk Drives

Continental Resources, a fast-track company in the computer/electronics industry needs an energetic and creative manager to take charge of a new and quickly growing product line.

As Product Manager for high speed line printers and disk drives this individual will have direct responsibility for planning market strategies, sales support and bottom line results! This is a high visibility position with tremendous reward potential. We anticipate that this product area will match and/or exceed our 50% annual corporate growth rate.

We are looking for candidates who have a B.S. degree in Marketing, 2-4 years of sales and sales support experience in a computer systems environment and possess those managerial skills that match an opportunity such as this.

Continental Resources offers an excellent benefits package and salary compensation.

If you want the opportunity to grow with us in an exciting, fast-paced environment, send your resume with salary requirements to:

**Craig N. Clive**
**Director, Human Resources**
**Continental Resources, Inc.**
**175 Middlesex Turnpike**
**Bedford, MA 01730**

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- APPLICATION & SYSTEMS ENGINEERING
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Individuals who join us are guaranteed an excellent starting salary in addition to a bonus-incentive plan. You'll also receive frequent reviews based on performance and a liberal benefits package that includes a pension-profit sharing plan. Come get the benefit of all this in an informal, flexible structure that provides you with the ultimate opportunity for personal and professional growth.

At present openings currently exist in:
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# PROGRAMMERS/ANALYSTS

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Unique compensation package for overseas assignments provides options for near term cash, deferred cash or investment in high growth business ventures. Net impact can produce at least two times your present earnings.

Work environment is dynamic, IBM 3033/3081 hardware, systems technology that only the Fortune 100 companies can afford, with unlimited opportunities for you to put these resources to work and confirm your reputation in the industry.

Your decision should be based on the desire for highest possible earnings, professional growth, freedom to exercise your capabilities, luxurious world wide travel and the opportunity to select your own retirement date.

Our decision will be based on whether we think you're in the top 10% of your professional bracket. **Please send your resume to:**

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**7315 Wisconsin Ave.**
**Suite 603 East**
**Bethesda, MD 20014**

## SYSTEMS ANALYSTS PROGRAM ANALYSTS

The North Carolina Baptist Hospital/Bowman Gray School of Medicine Computer Center is seeking qualified candidates for the positions of Systems Analyst and Programmer Analyst to assist in the development and maintanance of various management information systems. Three years previous medical and/or educational experience required for both positions. Honeywell L66 experience a plus. Send resume with salary history and requirements to: **Systems Manager, Medical Center Computer Center, 300 South Hawthorne Road, Winston-Salem, North Carolina 27103. EEO.**

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**Nat'ly. recognized mini-comp. vendor seeks bright articulate analyst for pra/post sales support. Prior mini-computar & pkg. installation exp. desired. Can laad to mktg. rap. role. Salary $24,000. (Fee Paid). Contact Garry Battista.**

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**DATA PROCESSING**

## SYSTEMS MANAGER

We are looking for a seasoned mgr. to oversee continued development of our long-range computer systems. Financial, P.O.S., & Retail inventory Mgmt. Systems are presently installed on existing Microdatas, and future development includes General Merchandising & Food Service P.O.S. & M.I.S. systems. We are a $30M retail & service organ. **Resumes: Personnel SSM, 308 Westwood Pl., LA, CA 90024. An Affirm. Action Employer.**

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Requirements - Degree in Computer Sciences, knowledge of and familiarity with IBM 370 & 3033 and the following languages: COBOL, CICS, PL1, FORTRAN, APL, BAL, IMS/DB/-DC. Forty hour week, overtime at 50%, bonus and medical benefits. Salary $24K. Send resume care of

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**Rocky Hill, CT 08067**

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An International Christian Mission has an immediate need for a Programmar/Analyst with Managemant skills. Previous axperience with an IBM S/3, S/34 or Data Base is desirable. Opportunities include: Design, installation and maintananca of donor record systam; Intarnational travel to our European and North American locations to prapara for systam implemantation; Coordination of data communications link with Canadian National offica. Plaasa sand resuma with salary requirements to:

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## Faculty Position Information Systems Department

Virginia Commonwealth University is accepting applications for three faculty positions in its expanding Information Systams Dept. PhD or DBA and industry or university taaching axpariance in Information Systems dasirad.

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Send rasume to: Dr. A. James Wynne, Chairman, Dept. of Information Systems, School of Business, Virglnia Commonwealth Univarsity, 1015 Floyd Ave., Richmond, VA 23284.

Data Processing

# SYSTEMS

Charter Medical Corporation, one of the nation's most aggressive hospital chains, is seeking systems pro's for its Information Services Division.

## Systems Analyst

Must have minimum one year experience with related degree. Formal project management experience in a multi-location health or financial institution very helpful. Prime consideration given to candidates possessing good oral and written communication skills.

## Systems Representatives

Must have one to three years experience with related degree. Should possess excellent communication abilities and have proven record of user oriented training on automated financial packages. Some travel involved

## Technical Analyst

Should have BS in Computer Sciences with four to six years program/systems design. Familiarity with Univac 90/80 a near must.

If a fast paced professional environment offering career growth in the Southeast is of interest to you and our opportunities fit your career plans, send your resume and salary history, in confidence, to:

Robert A. Mason
Manager, Human Resources

**Charter Medical Corporation**
Post Office Box 209
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Up and coming energy Company of Fortune 500 size is establishing regional EDP/MIS office on the Gulf Coast to service both refining and exploration and production operations. Current searches include:

**EDP/MIS Director**
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**Manager MIS**
**Programmer Analysts**
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All positions require appropriate EDP/MIS experience with preference given to candidates with Digital PDP11 Series exposure. Interested parties should send resume, letter of interest or call collect. All inquiries will be held in strictest confidence.

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**SR. S/A** — A progressive mfg. firm is searching for a S/A who has a strong fin. bkgd. & some knldge. of mfg. sys. Xlnt commun. skills req. for successful interface with end-user group. Compr. bnfts., good mgmt. opportunity. To $36K.

**DP MGR** — Mfg. div. of int'l co seeks exp'd COBOL P/A to supv staff of 3 & set up commun. netwk. Req. Sys. 3 exp. Xlnt. co bnfts. Limited trvl to SF, Dallas & Conn. To $30K.

**SYS. PROG.** — Use your tech expertise & join a leading co. specializing in sys. prog'g. Will consult with various clinet co's, conduct seminars & become an expert in your field. Req. strong bkgd in MVS &/or CICS sys. prog. Full reloc. & xlnt. co benefits. To $40K.

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# SYSTEMS SOFTWARE

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CICS Support Programming. A degree in Computer Science and experience on medium to large scale IBM (3033, 3158, MVS, IMS, CICS, DLI) computers desired. Environment consists of multi MVS systems using shared spool.

If you've been looking for the perfect IBM environment for your career, find it today at Amway. We can offer an attractive salary and benefit package including profit sharing, dental and vision insurance, and relocation to this prime recreational area in Western Michigan.

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At NAS, we're looking for talented computer professionals with the energy and initiative to fully utilize their technical expertise in advancing their careers. And, as a dynamic young company, we can provide just the right kind of environment for career advancement — one that encourages and rewards individual achievements.

So take the first step in proving your initiative. Apply yourself by calling Rosette Wurthrich toll free at 800-227-1930, to discuss the following openings. Positions are available immediately in San Francisco, Los Angeles, Atlanta, and Washington D.C.

### Systems Support Representatives

Consulting and providing technical support to field sales and marketing, you must be knowledgeable in the internals of IBM virtual operating systems (MVS, SVS, VS1, VM or DOS/VS). College degree or equivalent experience is required. The ability to write and present technical materials a plus. Openings nationwide.

### Field Engineers

If you have the skills and ability to excel in field engineering, you'll be recognized for it at National Advanced Systems. We have openings nationwide requiring an AA in electronics or equivalent military experience. Our more advanced positions require experience on IBM 370/158 or larger CPUs or associated peripherals experience.

### Field Support Representatives

Individuals experienced in problem solving with systems control programming are needed in our San Diego facility to resolve problems in customer systems software, assist field engineering with problem determination, and assist systems support representatives in running benchmarks.

If you can't call, send a letter of inquiry or a resume to Rosette at National Advanced Systems, 800 East Middlefield Road, Mountain View, CA 94043. We are an affirmative action/equal opportunity employer m/f/h.

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## EDP AUDITOR

You should have 2-3 years large IBM mainframe programming and/or systems analysis work including participation on a project development team. Such experience should be with financial systems.

B.S. in computer science, business, accounting & equivalent technical degree is required. A M.B.A. or M.S. is preferred. Relevant experience in auditing is also a plus but not required.

Ryder System, Inc. offers competitive salary and comprehensive benefits. If you're ready to grow as fast as we are, submit your resume in confidence to **Al Gullford, Corporate Personnel Specialist.**

RYDER
RYDER SYSTEM, INC.

**RYDER SYSTEM, INC.**
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Miami, FL 33152

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# Director of Computer Science Department

The Brooklyn Center of Long Island University seeks a Director with Professorial rank to develop undergraduate curricula in Business and Scientific Applications as well as to establish a Department of Computer Science.

Individual sought should possess a Ph.D. in Computer Science or related field and either academic or administrative experience.

Director will use resident faculty in Mathematics, Sciences and Business while developing and staffing the new Department. He/she should have a long-term commitment to develop a first-rate program in applied studies and research upon which graduate programs may be built. Familiarity with DEC equipment would be useful. Salry is competitive.

Send resume to: Director of Administration

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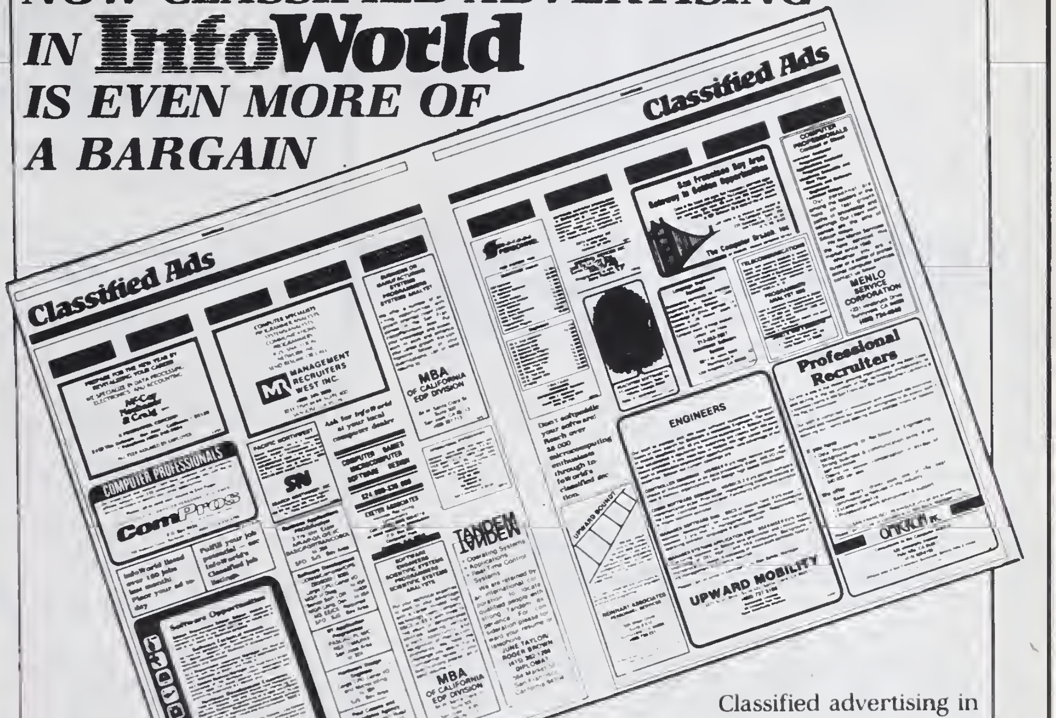

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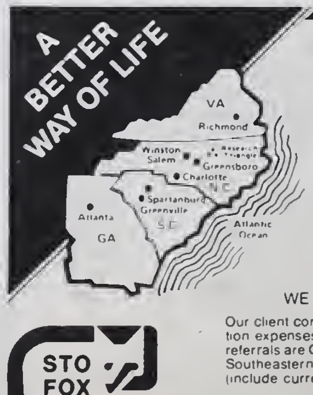

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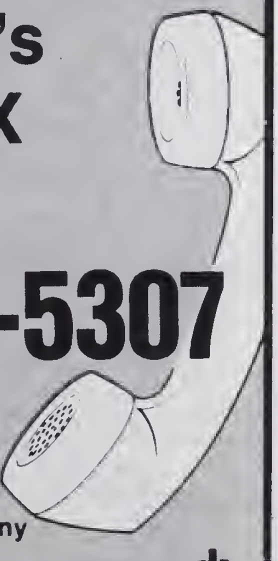

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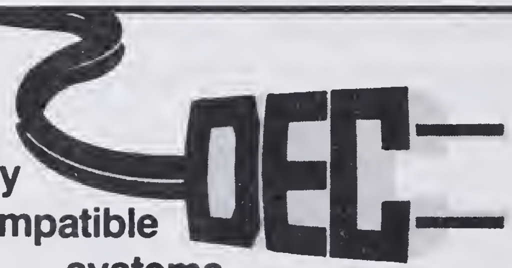

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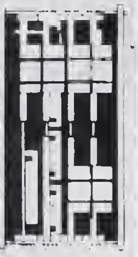

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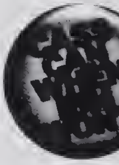

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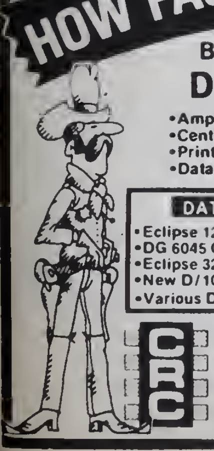

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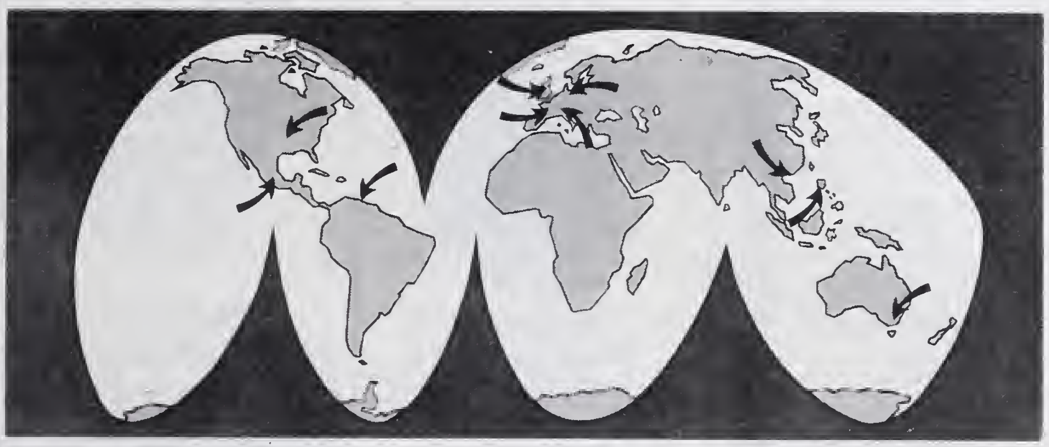

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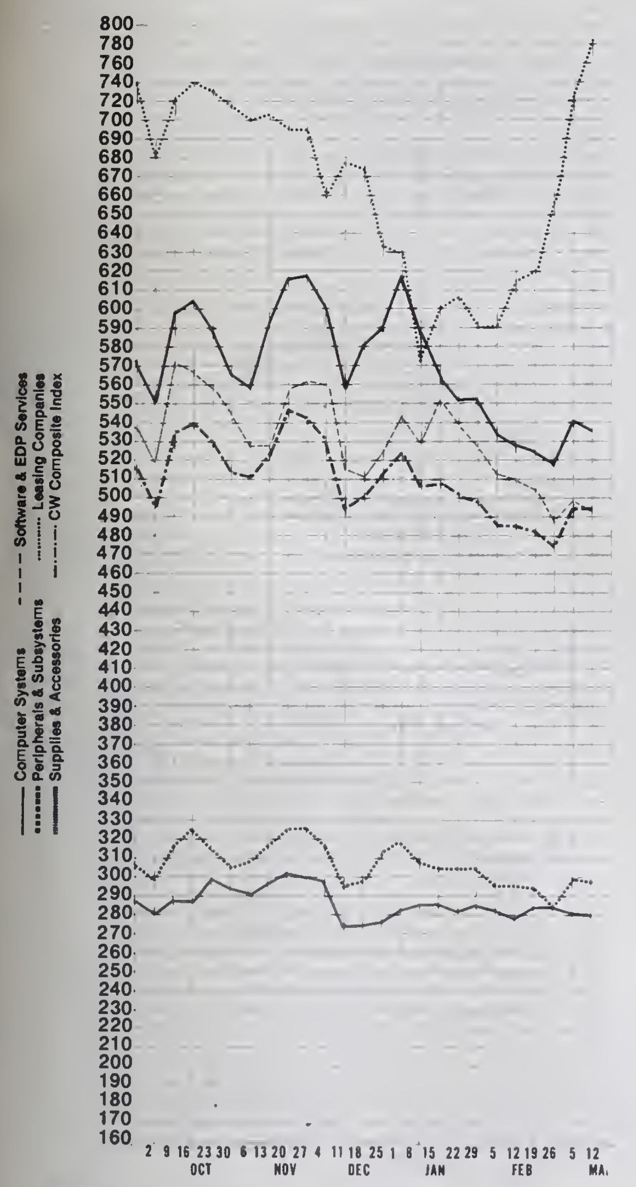

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TRADE QUOTES

# Computerworld Stock Trading Summary

CLOSING PRICES TUESDAY, MARCH 11, 1981

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE MAR 11 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | AMDAHL CORP | 15- 42 | 31 1/8 | + 3/4 | +2.4 |
| N | BURROUGHS CORP | 47- 88 | 49 1/4 | -2 3/8 | -4.6 |
| O | COMPUTER AUTOMATION | 9- 27 | 14 | -1 1/4 | -8.1 |
| N | CONTROL DATA CORP | 35- 77 | 60 3/4 | -5 | -7.6 |
| O | CRAY RESEARCH INC | 10- 49 | 32 7/8 | - 7/8 | -2.5 |
| N | DATA GENERAL CORP | 46- 87 | 47 7/8 | -4 3/8 | -8.3 |
| N | DATAPOINT CORP | 22- 60 | 49 1/8 | -1 3/8 | -2.7 |
| N | DIGITAL EQUIPMENT | 52- 98 | 83 1/2 | -2 1/2 | -2.9 |
| A | FECO INC | 6- 17 | 13 | - 3/8 | -2.8 |
| N | ELECTRONIC ASSOC. | 6- 12 | 7 7/8 | + 3/8 | +5.0 |
| N | FOUR-PHASE SYSTEMS | 19- 49 | 25 | +1 3/8 | +5.8 |
| N | FOXBORO | 31- 59 | 52 5/8 | +5 5/8 | +11.9 |
| O | GENERAL AUTOMATION | 7- 19 | 10 1/8 | +1 1/2 | +17.3 |
| O | GRI COMPUTER CORP | 1- 3 | 1 1/2 | 0 | 0.0 |
| N | HARRIS CORP | 25- 55 | 49 | +2 | +4.2 |
| N | HEWLETT-PACKARD CO | 46- 95 | 82 1/2 | -3 | -3.5 |
| N | HONEYWELL INC | 65-115 | 101 1/8 | -1 3/8 | -1.3 |
| N | IBM | 50- 79 | 62 1/4 | - 1/4 | -0.3 |
| O | MAGNUSON COMP SYSTS | 20- 46 | 30 | - 1/2 | -1.6 |
| N | MANAGEMENT ASSIST | 9- 25 | 15 1/8 | - 7/8 | -5.4 |
| O | MINI-COMPUTER SYST | 1- 6 | 1 5/8 | 0 | 0.0 |
| N | MODULAR COMPUTER SYS | 9- 31 | 18 5/8 | -1 1/8 | -5.6 |
| N | NCR | 52- 82 | 61 1/8 | -1 7/8 | -2.9 |
| N | PRIME COMPUTER INC | 10- 41 | 27 1/8 | -1 5/8 | -5.6 |
| N | PERKIN-ELMER | 13- 35 | 27 . | - 1/2 | -1.8 |
| N | SPERRY CORP | 42- 65 | 54 3/4 | - 3/4 | -1.3 |
| O | TANDEM COMPUTERS INC | 13- 76 | 66 1/4 | + 3/4 | +1.1 |
| N | TEXAS INSTRUMENTS | 79-150 | 107 1/4 | -3 1/8 | -2.8 |
| A | WANG LABS. | 17- 60 | 33 1/4 | - 3/8 | -1.1 |

### LEASING COMPANIES

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE MAR 11 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BOOTHE FINANCIAL CP | 13- 27 | 20 1/2 | - 1/2 | -2.3 |
| N | COMDISCO INC | 6- 24 | 17 1/2 | -4 | -18.6 |
| A | COMMERCE GROUP CORP | 1- 2 | 1 1/8 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 4 | 1/2 | + 1/4 | +100.0 |
| O | CONTINENTAL INFO SYS | 2- 15 | 6 1/4 | - 1/4 | -3.8 |
| M | DATRONIC RENTAL | 3- 5 | 4 1/2 | 0 | 0.0 |
| A | DCL INC | 3- 6 | 2 7/8 | + 1/4 | +9.5 |
| N | DPF INC | 5- 12 | 8 5/8 | + 3/4 | +9.5 |
| O | ITEL | 1- 15 | 1 1/4 | + 1/4 | +25.0 |
| O | LEASPAC CORP | 1- 2 | 3/8 | 0 | 0.0 |
| A | PIONEER TEX CORP | 2- 4 | 3 1/4 | - 1/2 | -13.3 |
| N | RELIANCE GROUP INC | 24- 79 | 69 3/4 | -2 | -2.7 |
| N | U.S. LEASING | 12- 28 | 26 1/4 | + 3/8 | +1.4 |

### SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE MAR 11 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 6 | 3 7/8 | - 1/2 | -11.4 |
| O | ADVANCED SYSTEMS INC | 12- 15 | 13 1/4 | + 1/4 | +1.9 |
| O | ANACOMP INC | 7- 24 | 15 7/8 | -1 1/2 | -8.6 |
| O | ANALYSTS INTL CORP | 3- 14 | 9 | + 1/2 | +5.8 |
| A | APPLIED DATA RES. | 6- 24 | 19 1/8 | +2 | +11.6 |
| N | AUTOMATIC DATA PROC | 31- 52 | 51 1/2 | + 3/8 | +0.7 |
| O | CGA COMPUTER ASSOC | 9- 17 | 12 1/4 | - 1/2 | -3.9 |
| O | COMPUTER HORIZONS | 1- 5 | 2 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 4- 9 | 4 7/8 | 0 | 0.0 |
| N | COMPUTER SCIENCES | 11- 30 | 16 5/8 | - 1/8 | -0.7 |
| O | COMPUTER TASK GROUP | 1- 23 | 16 | 0 | 0.0 |
| O | COMPUTER USAGE | 2- 10 | 5 3/4 | - 1/2 | -8.0 |
| O | COMPUT AUTO REP SVC | 4- 11 | 6 3/8 | - 1/4 | -3.7 |
| O | COMSHARE | 11- 21 | 13 1/4 | -1 1/2 | -10.1 |
| O | CULLINANE DATABASE | 18- 45 | 43 1/2 | +2 1/4 | +5.4 |
| O | DATA DIMENSIONS INC | 1- 6 | 1 1/8 | 0 | 0.0 |
| O | DATATAB | 1- 4 | 1 | 0 | 0.0 |
| O | DSI CORP | 4- 9 | 5 3/8 | - 1/8 | -2.2 |
| N | ELECTRONIC DATA SYST | 19- 44 | 42 | + 1/8 | +0.2 |
| O | INFORMATICS INC | 9- 25 | 24 1/2 | + 1/4 | +1.0 |
| O | INSYTE CORP | 1- 3 | 2 3/8 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1- 4 | 1 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 3- 9 | 5 1/4 | 0 | 0.0 |
| O | KEYDATA CORP | 1- 5 | 7/8 | - 1/8 | -12.5 |
| A | LOGICON | 12- 34 | 31 1/2 | -2 1/4 | -6.6 |
| O | MATHEMATICA INC | 5- 18 | 13 3/4 | 0 | 0.0 |
| O | MATHEMATICAL APP GRP | 7- 33 | 18 | +3 | +20.0 |
| O | NATIONAL DATA CORP | 5- 18 | 14 7/8 | - 3/8 | -2.4 |
| N | PLANNING RESEARCH | 5- 13 | 6 7/8 | + 1/8 | +1.8 |
| O | PROGRAMMING & SYS | 1- 1 | 1 | 0 | 0.0 |
| O | RAPIDATA INC | 4- 11 | 5 3/4 | - 1/4 | -4.1 |
| O | REYNOLDS & REYNOLD | 19- 34 | 18 3/4 | -1 | -5.0 |
| O | STSC INC | 6- 28 | 17 1/4 | -1 3/4 | -9.2 |
| O | SCIENTIFIC COMPUTERS | 3- 17 | 11 | + 1/4 | +2.3 |
| N | TYMSHARE INC | 17- 50 | 42 3/4 | +1 1/4 | +3.0 |
| A | URS CORP | 5- 17 | 13 5/8 | + 1/2 | +3.8 |
| N | WYLY CORP | 4- 20 | 11 3/8 | - 7/8 | -7.1 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE MAR 11 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | AM INTERNATIONAL | 11- 24 | 15 | +1 1/2 | +11.1 |
| A | ANDERSON JACOBSON | 9- 25 | 18 3/4 | +2 3/8 | +14.5 |
| O | AUTO-TROL TECHNOLOGY | 18- 62 | 30 1/2 | +2 | +7.0 |
| O | BEEHIVE INT'L | 2- 18 | 13 1/2 | -2 1/2 | -15.6 |
| A | BOLT,BERANEK & NEW | 12- 37 | 33 3/8 | +3 1/8 | +10.3 |
| N | BUNKER RAMO | 17- 47 | 47 1/4 | +5 5/8 | +13.5 |
| O | CAMBRIDGE MEMORIES | 1- 9 | 2 | - 1/8 | -5.8 |
| N | CENTRONICS DATA COMP | 13- 55 | 13 1/2 | - 5/8 | -4.4 |
| A | CETEC CORP | 3- 8 | 6 1/2 | - 1/2 | -7.1 |
| C | COMPUTER DEVICES INC | 5- 10 | 8 3/4 | - 1/8 | -1.4 |
| O | COGNITRONICS | 1- 10 | 9 5/8 | +2 3/8 | +32.7 |
| O | COMPUTER COMMUN. | 2- 10 | 2 5/8 | + 3/8 | +19.4 |
| O | COMPUTER CONSOLES | 4- 29 | 20 | + 1/2 | +2.5 |
| O | COMPUTER TRANSCEIVER | 1- 6 | 4 1/8 | - 5/8 | -13.1 |
| N | COMPUTERVISION CORP | 24- 92 | 66 1/4 | + 1/2 | +0.7 |
| N | CONRAC CORP | 13- 25 | 19 1/4 | + 1/4 | +1.3 |
| A | DATA ACCESS SYSTEMS | 6- 23 | 14 7/8 | - 3/4 | -4.7 |
| A | DATAPRODUCTS CORP | 11- 38 | 32 1/4 | - 1/2 | -1.5 |
| O | DATUM INC | 2- 5 | 3 1/8 | - 1/4 | -7.4 |
| O | DECISION DATA COMPUT | 2- 6 | 4 | + 1/4 | +6.6 |
| O | DELTA DATA SYSTEMS | 1- 3 | 2 1/2 | - 3/8 | -13.0 |
| O | DATARAM CORP | 6- 37 | 9 1/8 | - 1/2 | -5.1 |
| N | ELECTRONIC M & M | 3- 9 | 4 7/8 | - 1/2 | -9.3 |
| O | EVANS & SUTHERLAND | 21- 83 | 64 1/2 | + 1/2 | +0.7 |
| O | FABRI-TEK | 1- 4 | 3 | + 1/8 | +6.5 |
| O | GENERAL COMPUTER SYS | 1- 12 | 11 1/4 | 0 | 0.0 |
| O | GEN'L DATA COMM IND | 8- 22 | 14 7/8 | -1 1/8 | -7.0 |
| O | GENERAL TERMINAL CP | 1- 4 | 1 3/8 | - 1/4 | -15.3 |
| N | HAZELTINE CORP | 12- 33 | 22 7/8 | - 3/4 | -3.1 |
| O | INFORMATION INTL INC | 8- 15 | 12 1/4 | +1 1/4 | +11.3 |
| O | INTEL CORP | 23- 50 | 32 3/4 | -2 1/2 | -7.0 |
| A | LUNDY ELECTRONICS | 4- 17 | 10 | - 5/8 | -5.8 |
| O | MSI DATA CORP | 5- 16 | 15 7/8 | +2 1/8 | +15.4 |
| N | MEMOREX | 10- 34 | 11 1/2 | - 7/8 | -7.0 |
| N | MOHAWK DATA SCI | 10- 31 | 19 5/8 | -1 1/8 | -5.4 |
| O | NETWORK SYSTEMS CORP | 14- 25 | 16 3/4 | - 1/2 | -2.8 |
| O | OMEX | 2- 12 | 10 | 0 | 0.0 |
| A | PARADYNE CORP | 9- 37 | 32 1/2 | + 1/4 | +0.7 |
| A | PENRIL CORP | 9- 16 | 12 5/8 | + 1/2 | +4.1 |
| O | RAMTEK CORP | 10- 23 | 18 | +1 1/2 | +9.0 |
| O | RECOGNITION EQUIP | 5- 21 | 12 1/2 | - 3/4 | -5.6 |
| O | SCAN DATA | 1- 5 | 1 3/4 | 0 | 0.0 |
| N | STORAGE TECHNOLOGY | 12- 26 | 20 | - 5/8 | -3.0 |
| O | SYKES DATATRONICS | 14- 50 | 35 1/2 | -3 | -7.7 |
| O | T BAR INC | 14- 24 | 17 3/4 | + 5/8 | +3.6 |
| A | TEC INC | 3- 9 | 3 7/8 | - 1/4 | -6.0 |
| N | TEKTRONIX INC | 42- 70 | 53 3/8 | - 1/2 | -0.9 |
| N | TELEX | 3- 7 | 6 7/8 | + 3/8 | +5.7 |
| O | TESDATA SYSTEMS CP | 8- 26 | 9 1/8 | 0 | 0.0 |
| A | TIMEPLEX INC | 5- 22 | 12 | -1 5/8 | -11.9 |
| O | WILTEK INC | 1- 3 | 2 5/8 | - 1/8 | -4.5 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE MAR 11 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | AMERICAN BUS PRODS | 8- 16 | 15 7/8 | + 3/8 | +2.4 |
| O | BALTIMORE BUS FORMS | 1- 2 | 1/2 | 0 | 0.0 |
| N | BARRY WRIGHT | 8- 22 | 18 3/8 | - 1/2 | -2.6 |
| O | CYBERMATICS INC | 1- 2 | 1 | 0 | 0.0 |
| A | DUPLEX PRODUCTS INC | 11- 16 | 13 | - 5/8 | -4.5 |
| N | ENNIS BUS. FORMS | 13- 21 | 14 7/8 | + 3/8 | +2.5 |
| N | 3M COMPANY | 46- 63 | 59 1/2 | -2 3/8 | -3.8 |
| O | MOORE CORP LTD | 27- 37 | 33 3/8 | + 7/8 | +2.6 |
| N | NASHUA CORP | 20- 35 | 26 3/8 | - 5/8 | -2.3 |
| O | STANDARD REGISTER | 22- 35 | 33 1/2 | 0 | 0.0 |
| A | TAB PRODUCTS CO | 9- 30 | 16 1/2 | 0 | 0.0 |
| N | WALLACE BUS FORMS | 12- 26 | 23 | + 1/4 | +1.0 |

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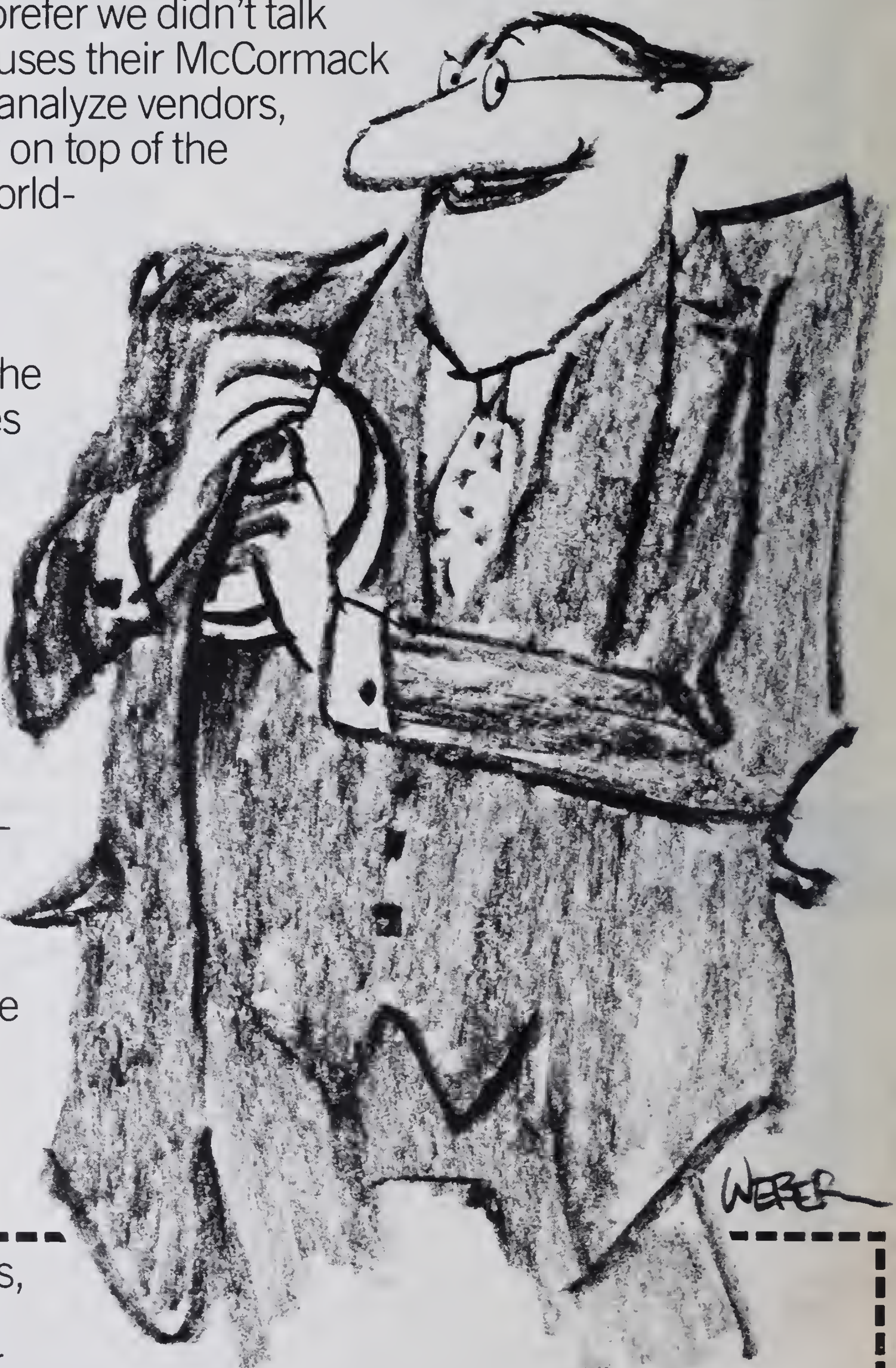

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